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AMERICAN JOURNAL of PHARMACY

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A Record of the Progress of Pharmacy and the Allied Sciences

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NOTICE OF COLLEGE MEETING: The Annual Meeting of the members of the Philadelphia College of Pharmacy and Science will be held on Monday, March 31, 1924, at 2:30 P. M. at the College, 145 N. 10th St., Philadelphia, Pa. (Reports of Standing Committees. Election of Officers and Trustees. Reports of Special Committees. General Business).

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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 96. FEBRUARY, 1924. NO. 2.

EDITORIAL

THE STORY OF DISTILLATION.

In these days, when captures and destruction of distilling apparatus are among the most conspicuous items of daily news, it may be worth while to turn back the dial of Ahaz and set forth some of the early efforts in the developing and perfecting of laboratory stills. Hermann Kopp, in his great classic "Geschichte der Chemie," has but a few pages on the subject, and Ernst v. Meyer, in his history, but a page. It is not astonishing that a German has written a book on the subject, but it is a small one, and a comprehensive treatise is still wanting. E. P. Häussler, who has been contributing to the *Schweizerische Apotheker-Zeitung* a series of articles on "The Development of Organic Chemistry Since 1800," devotes a section to the early history of distilling apparatus (*Schw. A-Z.*, 1923, *61*, 557).

The fact that the volatile portions of a substance could be obtained in a pure form by heating and condensing the vapors, was known to Aristotle, who states that sea-water can be thus rendered potable. Dioscorides (1st cent.) describes the preparation of free mercury by heating the sulphide with iron and collecting the metal on a cover of the crucible. The cover, termed "ambix" in Greek, became the name for the receiving portion, was taken into Arabic, the definite article "al" added, and the word later applied to the whole apparatus, becoming our "alembic." Characteristic throttled alembics are figured in the MSS of the early Greek alchemists, often with several outlets Häussler does not deal with these ancient forms, but practically limits his essay to the developments since the revival of learning. The alembic retained its form and was in frequent use up to a comparatively recent date. The catalogs of dealers in chemical glassware fifty years ago figured several forms, and the writer of this article used an alembic in his first employment of

the Wanklyn ammonia method for water analysis. Originally, it was made of metal or clay, but Kunkel (1630-1702) developed the method of working glass with a blast-lamp, and glass alembics were made. Further improvements were in the construction of heating and condensing apparatus. The older workers had often secured gentle, long-continued heating by immersing the vessel in dung or fermenting mixtures. In the Dutch white lead process, the prolonged, moderate heating required to volatilize the acetic acid was obtained by immersing the vessel in spent tan. The word "retort" is really a Latin adjective, the noun, "ampulla," "flask," being understood, the phrase meaning a flask bent back. Basil Valentine is credited with having first constructed what we call the tubulated retort, that is, one with an opening for introducing material.

Different forms were given to the hood of the alembic, which in German is called "Helm," apparently a derivative of the original Arabic word and connected with our "helmet." The principle of the reverse current of water, as in our familiar condenser, was not applied until about 1771, when Weigel, Professor at the University of Greifswald, described it in a thesis. The tube was at first tinned iron, but later he substituted a glass tube. It was not, however, until 1780 that Weigel's paper appeared in a scientific journal and thus was made known to a wide circle of chemists. It appears from Häussler's description that the cooling water was allowed to flow into the condensing gas. Later, an inner tube for the distilling material was fixed with plaster in an outer tube, subsequently modified by Liebig by using perforated corks for supporting the inner tube. In this form, with tin plate outer and glass inner tube, the apparatus came into regular use as "Liebig's condenser," an honor which the distinguished chemist does not deserve. He, himself, termed it "Göttling's condenser," from the name of the author of a small book in which the apparatus was described. This name was also not deserved. A similar misnaming has affected a special form of distilling apparatus, the familiar "Soxhlet extractor." This was described by Soxhlet, but he gives the credit of designing it to an assistant, Szombathy.

The methods of heating alembics and retorts underwent, of course, an evolution. It seems that, so far as western Europe was concerned, lamps were first in general use about 1690, spirit of wine and fatty oils being the fuel. Improvements were made by Baume (1773), Argand (1783), Göttling (1794), and Morveaux (1798),

but as late as 1853 small furnaces heated with solid fuel were figured in a manual of chemistry.

Over a long period these fundamental forms of stills were in use both in the laboratory and in the industries. The "pot still" is yet in frequent use, but the invention of dephlegmating tubes has greatly aided the separation of liquids, and fractional distillation has greatly extended the resources of some of the larger manufacturing operations. Distillation under reduced pressure has also been of great value in research. Just as alloys are obtainable of which the components will remain in association until the mass becomes solid, constituting the "eutectic," so mixtures of liquids can be obtained, the components of which are not separable by distillation, and which are termed "azeotropic." It has long been known that certain proportions of alcohol and water and also of water and hydrochloric acid distil as one substance.

Poring over these volumes of forgotten lore in science, the modern laboratory worker, with the wonderfully elaborate and efficient equipment, must have high respect for the zeal, earnestness and faithfulness of the founders of chemistry, and the same is true of every other department. It is certainly difficult for the present-day student to imagine a laboratory without gas or electricity, rubber tubing, pure chemicals, resistant glass and other gifts of invention and discovery. The philosophy of history leads us to the view that a generation hence, when most of the living workers have passed from the scene, many improvements will have been made and those that are then in the laboratories will wonder how their predecessors managed to accomplish anything with the facilities they had. It is impossible to prophesy, but from the rapid development of broadcasting it seems not impossible that in a few years, as far as didactic teaching is concerned, the lecture-room will be obsolete, the student will listen over his "hook-up" to the lecture delivered many miles away by some distinguished teacher. Perhaps many present-day lecturers will look aghast at such a development and be inclined to say with Hector, when he foresees the capture of Troy and the enslavement of his wife:

"May I be dead before that dreadful day,
Pressed with a load of monumental clay."

HENRY LEFFMANN.

THE AMERICAN PHARMACEUTICAL ASSOCIATION HEADQUARTERS BUILDING.

The worth-whileness of the project to establish a Headquarters Building to permanently house the various activities of the American Pharmaceutical Association must be self-evident to anyone who stops to consider its past and present services to pharmacy.

It fathered and created the state pharmaceutical associations, and has been the constant and consistent champion of the organization of all branches of the drug trade.

It formulated the first pharmacy laws, and its model drafts have been the source of the material embraced in practically all the state pharmacy acts of the present day.

It rescued the United States Pharmacopœia from comparative obscurity, and possibly from complete oblivion, and it is largely due to its labors that this book has become the leading official standard for drugs and medicines of the present age.

It created the National Formulary out of a work of purely local importance, and brought order and system out of the chaos of conflicting formulas with which the drug trade was formerly afflicted.

It was responsible for the adoption of the United States Pharmacopœia and National Formulary as the legal standards of the Federal Food and Drugs Act, thereby saving the entire drug trade from the burden of bureaucratically created standards for drugs and medicines.

It has not selfishly sought to monopolize the entire field of drug organization, but has encouraged the formation of national associations representing the separate branches of the drug trade, and has cordially joined hands with these divisional organizations in advancing their special lines of work.

It called into existence the National Association of Boards of Pharmacy that already has done so much to standardize and bring order and system into state board examinations, and to make inter-state recognition of certificates general and practicable.

It created the National Drug Trade Conference, composed of representatives of all national drug trade organizations, that

has been so largely successful in adjusting and preventing antagonism between the different branches of the trade, and has afforded the means of presenting the claims of the drug trade as a unit mass at Washington.

Its fifty-nine volumes of Annual Proceedings, six volumes of the Bulletin, ten volumes of the Year Book, and eleven volumes of the Journal embrace a total of over 65,000 printed pages, which can safely be said to constitute the most complete and comprehensive compilation of information relating to pharmacy and its allied branches issued by a single institution in the English language, if not in any language.

There is no field of pharmaceutical endeavor in which this association has not labored diligently and effectively, and there is no individual or institution that produces, buys, sells or uses drugs and medicines who is not indebted to the American Pharmaceutical Association in greater measure than he can ever hope to repay.

Its work has been altogether altruistic, without desire or expectation of material reward, and has been accomplished by the self-sacrificing endeavors of a host of earnest laborers.

It is, therefore, altogether fitting that those who have received so much from the Association should contribute to a Headquarters Building both to serve as a monument to the many unselfish members who have served the cause of pharmacy so efficiently and to provide the facilities that will enable the Association to render still broader and more valuable services to coming generations.

Among the facilities intended to be provided in the Headquarters Building are the following:

(1) Office quarters for the general executive officers and editors of its various publications, with ample storage room for surplus volumes of proceedings and other publications.

(2) Office space for the executive officers of such other national drug organizations as may desire to avail themselves of such facilities.

(3) An historical and research library where there can be gathered and preserved for reference the literature pertaining to pharmacy, both past and present.

(4) An historical museum where can be preserved the scat-

tered implements and articles showing the development of pharmaceutical art, and which without such a place of permanent preservation will be lost forever.

(5) One or more specially equipped Research Laboratories for the study of research problems connected with the revision of the United States Pharmacopœia and National Formulary, or researches having any other direct and practical application to pharmacy.

At the close of the last annual meeting at Ashville, something over $50,000 had been pledged towards this splendid project, which should be swelled to at least $500,000 by the opening of the convention at Buffalo in September next.

The particular city in which the proposed Headquarters Building is to be located has not yet been chosen, but, in accordance with the democratic theory and practice of the Association, will be selected by a free vote of the entire membership after a consideration of the claims and advantages of the several cities that may seek to become the site of this splendid monument to American pharmacy.

J. H. Beal, Urbana, Ill.

ORIGINAL ARTICLES

PLANT SCIENCE LABORATORY SEMINAR.*

(Botany—Pharmacognosy—Plant Chemistry—Pharmacology)

By E. L. Newcomb.

Pharmacognocists, plant chemists, botanists, pharmacologists and others interested in medicinal plants, vegetable drugs and food products pursued co-operative laboratory work together during the week of August 20, 1923, at the University of Minnesota. It was a unique gathering in many respects. No lengthy stated papers were read although there were a number of brief papers and addresses upon scientific subjects. There were numerous demonstrations in which not only the demonstrators but all in attendance took part in discussing the various processes, reasons for their employment or

*Held at the University of Minnesota, Minneapolis, Minn., August 20-25, 1923.

PHARMACOGNOSY SEMINAR, COLLEGE OF PHARMACY, UNIVERSITY OF MINNESOTA, AUGUST 20 TO 25, INCLUSIVE, 1923.

Photograph represents a little more than 50 per cent. of attendants. Upper row—left to right: Dr. M. Dittmer, R. A. Konnerth, A. J Schwartz, G. B. Gradinger, Dr. E. L. Newcomb, Dr. Arno Viehoever, Prof. C. C. Plitt, Dr. William Rabak, S. C. Corl, E. B. Fisher, Dr. H. Runkel, L. J. Schwartz, Dr. C. H. Rogers. Lower row: Dr. J. Hortvedt, Prof. E. J. Petry, Prof. E. N. Gathercoal, Dr. G. L. Keenan, Prof. H. W. Youngken, Prof. O. P. Canis, Dr. Hugh McGuigan, Prof. Anton Hogstad.

suggestions for improvement of the methods. The laboratory demonstrations and discussions were supplemented by field trips and excursions which were of unusal benefit to workers interested along plant science lines.

At the opening session which was called to order Monday morning at ten o'clock, Secretary *pro tem.* E. L. Newcomb requested C. O. Rosendahl to serve as temporary chairman of the group. This request was accepted and approved on account of the absence of R. A. Gortner, who, as chairman of the Arrangements Committee, was unavoidably absent.

Temporary Chairman Rosendahl called for nominations for permanent chairman for the week. E. L. Newcomb was unanimously selected. The selection of other officers for the conduct of future similar gatherings was deferred until later in the week, at which time it was felt that the group would be in a better position to consider the question.

Chairman Newcomb outlined the several suggestions and correspondence which led to the issue of the call for the Seminar. He pointed out that the urgent need for such a conference was clearly indicated by the numerous recent scientific discoveries along biochemical lines which were of direct interest and value on the one hand to pharmacologists and on the other to botanists and pharmacognocists. The methods of the bio-chemist he stated must come more and more into use by the pharmacognocist as a means of solving many of the problems relating to the therapeutic usefulness of our vegetable drugs.

Chairman Newcomb expressed the hope that the conference might, in time, become of as great value to the different interests represented by those assembled as the annual conferences at Woods Hole are to the biologists.

After these preliminary announcements and a few additional statements relative to the accommodations which had been provided for the workers during their stay at the University, the tentative program which had been prepared was taken up for study and such revision as might be found necessary. Each of the several workers presented in a few words the subject which he expected to discuss or demonstrate and referred to the material with which he would work. It was found that only slight changes were essential in the

preliminary program as issued and published.[1] The balance of the morning session was devoted to the completion of registration and informal discussion during which everyone became well acquainted.

The complete registration showed the attendance of the following men, practically all of whom were present from the beginning of the opening session:

Registration—Plant Science Laboratory Seminar

NON-RESIDENT:

Mr. W. H. Blome, Frederick Stearns & Co., Detroit, Michigan.

Professor O. P. M. Canis, College of Pharmacy, Fordham University, New York.

Dr. M. Dittmar, Department of Pharmacognosy, New Jersey College of Pharmacy and Pharmacognocist for Lehn & Fink, New York.

Professor E. N. Gathercoal, Department of Pharmacognosy, University of Illinois, Chicago, Illinois.

Mr. H. C. Hamilton, Research Department, Parke, Davis & Co., Detroit, Michigan.

Professor Anton Hogstad, Jr., Department of Pharmacognosy, and Director of Medicinal and Poisonous Plant Gardens, College of Pharmacy, South Dakota State College, Brookings, S. D.

Mr. D. F. Jones, Consulting Chemist, Watertown, South Dakota.

Mr. George L. Keenan, United States Insecticide and Fungicide Board, Bureau of Chemistry, Washington, D. C.

Mr. R. J. Konnerth, Pharmacognocist, E. R. Squibb & Sons, Brooklyn, New York.

Dr. Hugh McGuigan, Department of Pharmacology, Medical School, University of Illinois, Chicago, Illinois.

Professor E. J. Petry, Consulting Botanist, South Dakota State College, Brookings, South Dakota.

Professor Charles C. Plitt, Department of Botany, College of Pharmacy, University of Maryland, Baltimore, Maryland.

[1] *Northwestern Druggist*, July, 1923.

Mr. A. J. Schwarz, Pharmacognocist, Eli Lilly & Co., Indianapolis, Indiana.

Mr. L. J. Schwarz, Pharmacognocist, United States Bureau of Chemistry, New York City, New York.

Dean E. R. Serles, College of Pharmacy, South Dakota State College, Brookings, South Dakota.

Dean W. F. Sudro, School of Pharmacy, North Dakota Agriculture College, Fargo, North Dakota.

Dr. Frank Thone, Curator, Yellowstone National Park.

Dr. Arno Viehoever, Department of Biology and Pharmacognosy, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.*

Dr. H. W. Youngken, Department of Pharmaceutical Botany and Pharmacognosy, Massachusetts College of Pharmacy, Boston, Massachusetts.

RESIDENT:

Dr. G. Bachman, Department Theory and Practice of Pharmacy, University of Minnesota.

Dr. E. D. Brown, Department of Pharmacology, University of Minnesota.

Mr. S. C. Corl, Chemist, Minnesota Food and Drug Laboratory, St. Paul.

Mr. Earl B. Fischer, Department of Pharmacognosy, University of Minnesota.

Mr. W. A. Frost, Pharmacist, St. Paul.

Mr. C. B. Gnadinger, Chief Chemist, McLaughlin-Gormley-King Co., Minneapolis.

Dr. R. A. Gortner, President, University of Minnesota Plant Science Group and Chief Division Agricultural Bio-Chemistry.

Dr. R. B. Harvey, Department of Botany, University of Minnesota.

Mr. E. R. Hodel, Chief Chemist, North Star Woolen Mills, Minneapolis.

Dr. J. Hortvedt, Chief Chemist, Minnesota Food and Drug Laboratory, St. Paul.

*Formerly Chemist in charge of Pharmacognosy Laboratory, U. S. Bureau of Chemistry, Washington, D. C.

Mr. G. A. N. King, McLaughlin-Gormley-King Co., Minneapolis.

Mr. George Lark, Department of Pharmacognosy, University of Minnesota.

Dr. E. L. Newcomb, Department of Pharmacognosy and Pharmaceutical Botany, University of Minnesota.

Dr. L. F. Palmer, Department Agricultural Bio-Chemistry, University of Minnesota.

Dr. T. S. Roberts, Director, Zoölogical Museum, University of Minnesota.

Dr. C. H. Rogers, Department of Pharmaceutical Chemistry, University of Minnesota.

Dr. C. O. Rosendahl, Department of Botany, University of Minnesota.

Dr. H. Runkel, Chief, United States Food and Drug Inspection Station, Minneapolis.

Mr. C. E. Smythe, Department of Pharmacognosy, University of Minnesota.

Dean F. J. Wulling, College of Pharmacy, University of Minnesota.

Wulling Extends Welcome

The feature of the first evening session was an address by Dean F. J. Wulling.

Dean Wulling's address was an extemporaneous one and occupied a period of about fifty minutes. The Dean extended to all participants in the Seminar a hearty welcome on behalf of the College of Pharmacy, its faculty and the University and assured all that the full facilities of the College were at the disposal of the conference. The Dean gave his fullest commendation of the fine and altruistic spirit that actuated the men of science present to forego, in many cases, their vacations and the comforts of a rest in the summer-time, to give of their strength, energy and time to the welfare of the calling and scienes that would benefit directly and indirectly from their individual and collective work during the week in which the Seminar was in session.

The Dean stated that he had gone through the program carefully and that he thought it a well-balanced one. He hoped complete notes and records would be kept of all work for the benefit of future conferences which he hoped would be held. He thought

the program would prove particularly helpful to the Plant Science groups.

The Dean was particularly pleased with the spirit that prompted the conference because it pointed to a great improvement in the co-operation between scientists. The minds of scientists often are of the non-co-operative type but during recent years there has come the development of co-operative work among scientific men so that things are being accomplished now collectively which are impossible of accomplishment through the individual mind alone.

The need of a more selective, representative and restrictive materia medica was stressed by the Dean. He hoped that by co-operative scientific work a very large number of drugs and medicines of no outstanding medicinal qualities would be eliminated and the really valuable drugs reduced to the least possible number and thoroughly standardized. He hoped the time would come soon when pharmacists and also physicians would not be expected to be encyclopedias of materia medica but that it would be expected that they would be intimately and thoroughly and scientifically familiar with a specified but limited and tested list of drugs and medicines. Much of the complexity of life is due to a lack of discrimination between the essential and non-essential. It was pointed out that the mind of the scientific and analytic bent must some time soon refuse to occupy itself with the non-essential so that its work will be the more constructive and valuable to society. The Dean also claimed that there were too many books on scientific texts and researches which aided and abetted the complexity and confusion existing in science and in the literature on science. He would not eliminate one useful item or fact in any book but he would emphatically eliminate the much worthless and inconsequential portions of many texts.

The speaker praised the scientific men for their ideals and altruism and emphasized the fact that all of the really great work in science was done without thought of monetary or material remuneration. The basic and fundamental work in science has always been carried on without the thought of financial profit or exploitation.

Quite a number spoke following Dean Wulling's address, commending the many excellent suggestions which had been offered. These thoughts were well summarized by Professor Petry who said:

"In these days of rush, hurry, and expedience, such that true research is much slighted or poorly done, Dean Wulling's address comes as an agreeable relief and a rich treat. His friendly and informal way of imparting invaluable advice through the medium of excerpts from his own patient and excellent labors at the University of Minnesota, can not help but touch in a peculiarly sympathetic and helpful way, those of us who have borne administrative responsibility. Moreover, to the younger men who are pushing research, the Dean's address presents some of the most valuable advice along the lines of courage and of breadth of outlook. I am sure I express the wish of all that Dean Wulling may have the pleasure of seeing this new organization, which he and his associates have so kindly fostered, grow greatly through many years to come."

Following the address by Dean Wulling, the meeting was thrown open for the work of the general program.

The subject matter discussed during the Seminar is reported here in eight parts as follows:

I. Handling of crude drugs and spices.

II. Botanical and Biological Problems.

III. The Organization of the National Research Council with special reference to Plant Science.

IV. Microscopic and Microanalytical Methods.

V. Pharmacognosy Research and Teaching Problems.

VI. Chemical Control of Economic Plant Products.

VII. Biochemical Studies, including Vitamins and Plant Colloids.

VIII. Pharmacological Studies, including Digitalis and plants causing hayfever and skin diseases.

I.

FOOD AND DRUG DRYING, CLEANING AND MILLING.

Inasmuch as the basis for the plant science course is the plant, the first several sessions of work were devoted to demonstrations involving the use and study of fresh plants or crude vegetable materials. E. L. Newcomb, assisted by E. B. Fischer, C. E. Smythe and George Lark conducted the workers through the department of pharmacognosy and described the

apparatus used for the drying and preparation, cleaning and garbling of drugs, spices, and food products. A specific demonstration was made of the cleaning of whole belladonna root by means of a gyrator sifter, the drug being shaken over a No. 40 standard mesh screen at the rate of about 120 pounds per hour. The result of this demonstration was tabulated as follows:

Weight of cleaned belladonna root obtained,	59.0 lbs.
Weight of fine dirt siftings removed,	1.6 lbs.
Per cent. fine dirt siftings removed,	2.7 %
Weight coarse dirt siftings,	7.1 lbs.
Per cent. coarse dirt siftings,	12.0 %

In a similar manner the cleaning of an original bale of African ginger was demonstrated. The result of this latter process was as follows:

Weight of cleaned African ginger obtained,	97.0 lbs.
Weight of fine dirt siftings removed,	1.2 lbs.
Per cent. of fine dirt siftings removed,	1.2 %
Weight of coarse dirt siftings removed,	0.7 lbs.
Per cent. coarse dirt siftings,	0.7 %

Those in attendance who were particularly interested in these phases of pharmacognostical work took an active part in the demonstrations and discussions.

Drug Sampling, Grinding, Powdering and Sifting Demonstrations.

The entire fifth session, Tuesday afternoon, was devoted to demonstrations in the drug milling laboratory. The preparation of a percolating powder from a bale of select wild cherry bark was first taken up. The drug was ground by means of a Schutz-O'Neill Disintegrator using a one-eighth inch screen in the mill. The grind was sifted over a No. 12 mesh screen in a gyrator sifter except in the case of the first grind where a No. 20 sieve was used. The weight of the portion passing through the screen was recorded and the coarse tailings returned to the mill for further grinding. This procedure was repeated until practically the entire bale was reduced to a degree of fineness sufficient to pass through the screen. It was

necessary to return the coarse tailings three times in order to produce the desired result. The final results were tabulated by Mr. Fischer and presented as follows:

Original weight of wild cherry bark to be ground, grind; Disintegrator, one-eighth inch screen,	120.5 lbs.
Weight of No. 20 drug obtained,	78.5 lbs.
Time of grinding, 45 minutes.	
Time of sifting, 40 minutes.	
Second grind—Disintegrator one-eight inch screen	
Weight of No. 12 drug obtained,	19.5 lbs.
Third Grind—Mill set as above	
Weight of No. 12 drug obtained,	15.0 lbs.
Fourth Grind—Mill set as above	
Weight of No. 12 drug obtained,	4.75 lbs.
Weight of final tailings—(mostly cork),	2.25 lbs.

While the process of producing a percolating powder from the wild cherry bark was being carried out, a demonstration was made of the production of a fine powder of senna. For this purpose the Schultz-O'Neill Limited Pulverizer was used. The following results of this demonstration were recorded:

Weight of whole senna leaves to be powdered,	117.0 lbs.
Weight of fine powder obtained,	116.5 lbs.
Time required to pulverize—two hours.	

While these milling operations were being carried on Mr. Gnadinger, Dr. Runkel, Mr. L. J. Schwarz, Mr. Konnerth and A. J. Schwarz demonstrated the methods which they employed in withdrawing samples from original bales of drugs. The sampling of gelsemium, senna, squill, serpentaria and a number of other drugs was shown. In the case of gelsemium the samples as withdrawn by Dr. Runkel and Mr. Gnadinger were pulverized separately and reserved for making of ash determinations. The remaining portion of the bale was then powdered in the disintegrator and the resulting powder thoroughly mixed from which a third sample was withdrawn for ash analysis. Dr. Runkel and Mr. Gnadinger then proceeded to make the ash determinations and at the evening session presented the following results:

ASH YIELD OF GELSEMIUM ORIGINAL BALE.

Sampled by	*Total Ash*
Mr. Gnadinger,	5.30%
Dr. Runkel,	2.80%
Entire bale ground and mixed,	4.70%

The results brought forth considerable discussion and emphasized the great difficulty in sampling drugs of this character. The discussion on this subject will be found in the report of the next session.

While the experiments in sampling were being conducted a demonstration was made to illustrate the difficulties in producing a uniform percolating powder from a select, dry and clean belladonna root. The belladonna which had been cleaned on the previous day was ground in the disintegrator, the machine being set with a coarse screen. The resulting grind showed a very large percentage of exceedingly fine powder. A screen analysis was not necessary to indicate that probably 50 per cent. of the grind would pass through a No. 60 mesh screen.

Screen analyses were made of the grinds of wild cherry bark, senna leaves, and the gelsemium. These demonstrations were made by Mr. Smythe and Mr. Lark. The tests were carried out by means of a W. S. Tyler Ro-Tap Sieve Shaker. The results of these tests were tabulated and presented in the following form:

	Number of Sieve and % Passing Through								
Name of Drug	12	20	30	40	50	60	80	100	120
Wild Cherry 1st grind			47.7	8.5	14.5	9.0	1.6	18.4	
" " 2d "	24.5	22.5	14.0	5.2	13.3	7.0	13.3		
" " 3d "	16.0	17.6	12.3	7.5	14.3	10.0	21.4		
Gelsemium 1st "	15.0	16.0	9.5	5.0	13.0	11.0	31.6		
Senna 1st "				2.0	12.0	26.9	14.5	11.5	32.8

The above tests on wild cherry bark were completed in the Ro-Tap in fifteen minutes. The other tests were run thirty minutes. The separations were exhibited and it was pointed out that none of the powders could be considered strictly of U. S. P. or N. F. specification, inasmuch as they did not meet with the requirement relative to uniformity in degree of fineness of a powdered drug. Additional sieving tests were made of a series of commercial powders and these as well as the results of several hundred other tests were presented to show that

the present specifications are purely theoretical and impracticable if not impossible of attainment.

Samples were withdrawn from the powdered senna produced and these were analyzed for total and acid insoluble ash. The results which were presented at the evening session were as follows:

SENNA LEAVES POWDERED DURING SEMINAR.

Total ash		10.88%	11.01%
Insol. "	(10% HCl)	2.12%	2.22%
Sol. "		8.76%	8.79%

The entire group worked until a late hour in discussing problems more or less relating to the demonstrations of the day.

Handling of Drugs and Spices.

Dr. Viehoever called attention to the bulletins of the Sub-Committee on Drug Markets (U. S. P. Revision Committee) and an address given before the meeting of the Association of Food and Drug officials, Southeastern States, Asheville, N. C., which was printed in the *J. A. Ph. A.*, Vol. XI, pages 592 to 595, 1922.

An attempt was made to touch upon the various phases and the principles involved in the handling of crude drugs and spices, namely, collecting cleaning of the fresh materials, drying, cleaning of dried materials, shipping, storing, milling and sampling.

He related the efforts of the Government to bring about greater care in the collection of drugs, which could be readily cleaned, by washing, for instance shortly after collection (see pamphlet above referred to).

With respect to the cleaning of dried material he referred to the process of selecting sifting. As more fully described in a paper presented before the Ashville meeting of the Scientific Section (to be published in the *J. A. Ph. A.*), the use of a fine bolting cloth permits to sift out dust or fine sand from such products as Kamala. Similarly, screens especially selected have been used for other drugs and spices to eliminate excessive mineral matter or admixed vegetable tissues. This process already used to some extent by drug millers should be more generally

applied by wholesalers of crude drugs in the growing as well as in the manufacturing district. Care should be taken, Dr. Viehoever emphasized in support of Professor Newcomb's findings, that in milling, fairly uniform powders be obtained, *e. g.*, powders which are representative of the whole drug and which pass the screen, marked by the respective numbers, say 20, 40, etc.

With respect to drying, Dr. Viehoever, referred to his observation of mouldy roots of blue cohosh (caulophyllum, N. F.) in some of the crude drug warehouses of the growing district. He mentioned the lack of care in drying practiced by some of the collectors and indicated briefly the various methods, both crude and adequate, employed in the drying—as discussed in the recent Department Bulletin on Drying of Drugs, prepared by Mr. Russell of the Bureau of Plant Industry. With respect to shipping he mentioned that the sacks containing the drugs were often either without any label or just labeled "drugs" or "herbs."

With respect to storing he found some deplorable conditions in the drug collecting regions, which, no doubt, were the cause for some of the mouldy, discolored and otherwise inferior drugs on the market. He mentioned that cold storage had been used with satisfaction in the case of insect infested material. He also related that ergot infested with mites was reconditioned by heating it for several hours at a temperature of 50 degrees C., causing the destruction of mites.

With respect to the subject of sampling, which was quite generally discussed, he emphasized that any methods adopted can at best be a compromise, that the number of samples and amount to be taken for examination of shipments would much depend on circumstances. He related the Government's aim to prevent the trade in inferior drugs and for this reason examined when at all possible, every shipment of drugs under justified suspicion, such as Levant wormseed, often found to be practically bare of santonin. He favored nevertheless the adoption of a general procedure of sampling as applied to certain selected commodities, as proposed by Dr. Runkel during the meeting.

Speaking of the examination of crude drugs and spices for cleanliness, he referred to a simple flotation method using car-

bon tetrachloride and preferably a specially constructed sedimentation tube described in a paper published in the *J. Assoc. of Official Agricultural Chemists,* Vol. 6, pages 466 to 472, 1923.

With respect to detection of mould, especially in powders, he referred to the Chitin-test, published in the *J. A. Ph. A.*, 6, 1917, pages 518 to 524.

With respect to the identification of many drugs he encouraged the more extended use of simple tests, which can be carried out without special laboratory equipment and without loss of much time or material, such as the heating of dry quinine bark, yielding a characteristic red tarry distillate.

Drug Sampling and Sifting Discussed.

The remaining part of the session was mainly devoted to a discussion on sampling and uniformity of powdered drugs. The discussion was continued by Dr. Runkel who outlined some of the difficulties which were encountered in connection with sampling foods, particularly in connection with sampling butter. The three points which he emphasized as being of some importance in connection with sampling in general were: The purpose for which the sample is drawn; the manner of drawing the sample, and the relation of the variations in the constituents in which the sample is drawn to the number of samples to be drawn. It was also pointed out that the American Society for Testing Materials had spent several years in completing a method for sampling coal and the A. O. A. C. had so far only inserted methods of sampling for seven different products in their compilation of methods of analysis. It was stressed that very valuable assistance could be rendered by inserting such methods of sampling in the United States Pharmacopœia after very careful study had been made of the methods which it is proposed to insert.

In discussing the question of sampling further A. J. Schwarz said:

"In regard to sampling a shipment of drug, I do not agree with those who state that inspecting ten per cent. of the containers is sufficient. I believe that each container should be opened before an identification tag is placed on it. It is true that different viewpoints on this question are permissible. In

behalf of government inspection it may be well enough to pass on ten per cent. of the drug that enters the port. But from the viewpoint of the manufacturer, it is not sufficient to look at five bags of a fifty-bag shipment and take for granted that if five are O. K., the fifty must be O. K. The well-established reputation of manufacturing houses could not be so put at stake. In my experience as pharmacognocist at the Eli Lilly Company we have had several cases in which we received a shipment of drug containing one or two bags of some drug other than that specified: for example, bloodroot in mandrake, serpentaria in blue cohosh, pink root in serpentaria, twin leaf in blue cohosh, veratrum in black hellebore. These, I am quite positive, were not intended as adulterations; they were merely mistakes in shipping. Chances are that the miller would catch such cases, but where two very similar drugs are mixed chances are just as likely that he will not.

"Large shipments cannot receive the attention that small shipments do. In obtaining a representative sample of a bag of drug, a portion should be taken from the top, bottom and side of the bag. This can be followed if the number of bags in a lot does not exceed ten. For lots larger than this the sample should be taken from the top and side of one bag, bottom and side of the next, and so on. The entire sample, which consists of the sample of each bag, should be quartered; this should then be requartered and on down until a working sample is obtained—a pound sample for a 1000 pounds of drug or less. In selecting the quarter for the sample, it will be more representative if half of two opposite quarters is taken and combined. In order to have a fair percentage of soil or fine material present in the official sample, it is well to sift it out over a coarse sieve. This fine material should then be quartered and added to the quarter of drug taken as the sample.

"In sampling carload lots of drug, such as cascara, yerba santa, etc., the method I employ is to take only a single sample from each bag. From the first bag it is taken from the top; the second bag is cut at the side; the third at the bottom; the fourth at the side; the fifth at the top and so on. This produces a fair sample with greatest economy of time."

In connection with the sampling of drugs and particularly Mr. Schwarz's demonstration on the quartering of serpentaria, Professor Gathercoal mentioned that the quartering of vegetable drug samples should not be attempted by the sampler, but should be done only by the pharmacognocist. His suggestion met with some opposition, the thought being presented that in government work at least the sampler or inspector usually had the whole matter of taking the sample in his own hands and that he should be just as capable of accurately quartering the sample as he was of extracting a fair sample.

In discussing the specified fineness of powders Professor Gathercoal said:

"In regard to the degree of fineness of a drug powder for the preparation of a galenical, there have occurred to me, as undoubtedly to others, a number of thoughts which might be summarized as follows:

"First—There are in the market commercially prepared powders of individual drugs, that presumably contain the entire drug, yet vary widely in their average degree of fineness. For instance, a cinchona 'ground for percolation' differs from a cinchona in 'fine powder' even though sifting experiments may show that the so-called No. 20 is a mixture of all the powders from No. 12 to No. 120 or finer and the so-called No. 80 may contain powders from No. 50 to No. 200.

"Second—Powders of different degrees of average fineness are required for the preparation of the various classes of galenicals. Pharmacists undoubtedly have the right to choose or designate the fineness of the powder, that they desire to use in the preparation of galenicals. The pharmacognocist should certainly be consulted by them in regard to the best means of powdering drugs and in regard to the degree of fineness which it is possible to obtain with various drugs.

"Third—There seems to be no question from the experimental data at hand that the degrees of fineness as defined by the Pharmacopœia are commercially unattainable, provided the whole of the drug is included in the powder. Yet a classification and defining of the fineness of powders is essential.

"Fourth—There certainly should be more uniformity regarding the specification of the powder of a drug where it is used in the same type of galenical in both the U. S. P. and N. F.

"Fifth—From a study of the lists of drugs employed, it is evident that a relatively few degrees of fineness of powdered drugs would be ample to care for all pharmaceutical uses. Under fluid extracts twenty-four drugs are directed to be in No. 20 powder, sixty-six drugs in No. 30 powder and fifty-three drugs in No. 40 powder; two drugs are 'cut' and four are to be in No. 60 powder. A 'ground for percolation' powder of an average degree of fineness, about No. 30, would probably meet, with a few exceptions, all requirements for fluid extracts. Of the thirty-nine drugs used for extracts, twenty-six are to be in Nos. 20 to 40. Of the 127 drugs used for tinctures, eighty-two are to be in Nos. 20, 30 or 40; five are 'cut' and forty in fine or very fine powder. Of the approximately 560 drugs used in the U. S. P. and N. F. galenicals, 318 are to be in Nos. 20 to 40 powder; 159 in Nos. 50 or 60 powder and sixteen in Nos. 80 or 100 powder; the remainder, about seventy, are whole, cut, bruised, sliced, rasped, grated or in very coarse powder.

"An impalpable powder (No. 150 to 200) is also occasionally met with in pharmacy, as, for example, Persian insect powder.

"It would seem therefore, as though five degrees of fineness might be designated and that these would answer all pharmaceutical purposes. Thus, as a suggestion:

Very coarse powder	(Nos. 6 to 20)
Coarse powder	(Nos. 20 to 40)
Fine powder	(Nos. 40 to 80)
Very fine powder	(Nos. 80 to 120)
Impalpable powder	(Nos. 150 to 200)

"If the designating of powders by numbers were superseded by names, and please note that powders are now frequently designated by name in the U. S. P. and N. F., the difficulty of defining the powder would be much lessened. There would be little objection to defining a 'coarse powder' as one of which at least ninety-five per cent. would pass through a No. 20 sieve but not more than seventy-five per cent. would pass through a No. 40 sieve. The percentages used are for illustration only."

Milling Plant Visited.

Through the courtesy of the McLaughlin-Gormley-King Drug Milling Company an inspection of the milling plant was made possible, both Mr. G. A. N. King and Mr. C. B. Gundinger leading the party. Here different types of drug mills, disintegrators, cutters, etc., were studied, also original containers and methods employed for storing drugs in large commercial quantities.

II.

BOTANICAL AND BIOLOGICAL PROBLEMS.

The first two hours of the fourth session, Tuesday morning, were devoted to an excursion through the greenhouses of the Botanical Department and the medicinal plant gardens.

Dr. Rosendahl took charge of the party through the botany greenhouses. In explaining the work carried on in this department, Dr. Rosendahl said:

> "On account of limited space most of the plants at present grown in the botany greenhouses are for instructional purposes. Very little attention therefore is devoted to showy and attractive exotics and unique or bizarre form. The aim is to cultivate a sufficient quantity and a considerable range of variety of plants to provide ample teaching material for classes in elementary botany, taxonomy, physiology, and ecology. For this reason there are to be found representatives from all the main groups of the plant kingdom except marine algæ. To illustrate for example, growth forms and habitat types for ecological work there are collections of mesophytes, xerophytes, hydrophytes and aquatics. In like manner representatives of various important orders and families of the flowering plants are cultivated for use in taxonomy and many species of economic importance like fibre plants, tropical and subtropical fruits, spices, etc., are grown.
>
> "Experimental work in plant physiology requires the cultivation of a considerable number of certain species like *Bryophyllum, Begonia, Coleus, Geranium, Cabbages,* and others and for many of these experiments special dark rooms, cold houses, moisture cases, etc., are utilized."

In the medicinal plant garden E. L. Newcomb explained methods which were employed by students in the study of

medicinal plants, the collection and preparation of vegetable drugs. The opportunity was afforded for the collection of herbarium material or drug specimens by those who desired to do so. The morning session was closed with a demonstration by Dr. Rosendahl on methods for preparing herbarium material, of which the following is an outline:

Preparation of Herbarium Material.

Preparation of herbarium material involves three principal operations, viz.: First, collecting and bringing in of material; second, pressing, drying and preparing specimens, and third, mounting, classifying and accessioning the specimens.

In collecting material on daily excursions from a central base it is found most practical to bring in the plants in the regulation tin vasculums. It has been found that plants will keep fresh better in cans which have a white enamel coating than those painted green or dark. Vasculums of large size (6x 9x20 inches) are preferable. The best results in pressing and drying are to be had by using corrugated boards between the driers, permitting free circulation of air through the pack. If the pack is placed over a radiator or suspended over a couple of ordinary incandescent lamps, specimens can be dried in twenty-four to forty-eight hours. By this quick curing method much finer specimens may be obtained and the tedious operation of frequent changes of driers is largely obviated.

In mounting specimens it has been our experience that a fairly heavy paper—two-ply Waldorf Bristle—is much more serviceable than thinner sheets. Specimens mounted on this heavier type of paper are handled much more readily and are much less liable to mutilation.

The specimens are attached to the sheets by means of narrow strips of gummed cloth, and for this purpose Dennison's Mending Tape has proved the best. This method is preferable to glueing the whole plant to the sheet. It is less mussy and another important advantage lies in the fact that both sides of the specimen may be examined and individual flowers may be removed for study without serious harm, as is the case when the specimens are glued firmly to the paper.

Classifying and labeling of the plants is generally done before they are mounted but in cases where critical work is required this work frequently has to be delayed until one has sufficient time to compare the material with herbarium specimens and consult the necessary flora, manuals and monographs.

The work of accessioning is, for the most part, relegated to assistants who in our own case are students who have had some training in systematic botany. Opportunity for individual work on the local flora or on special groups is encouraged and facilitated by a large working herbarium and an extensive library.

Inspect Botany and Biology Departments.

The first hour of the seventh session was devoted to an excursion to the Botany and Biology Departments and to the sunken gardens of the College of Pharmacy. Dr. T. S. Roberts piloted the group through the Museum of the Biology Department and explained the various exhibits with special reference to the wax reproductions of plants contained in several of the groups. The wax reproductions as well as the special groups of animals are among the best known in the United States and attracted a great deal of interest. Lack of time prevented more than brief remarks by Lecturer Roberts, but he assured the party that more complete and worthwhile explanations and demonstration would be given should it be decided to hold the Seminar a second time at Minnesota. The department has developed a most valuable collection of motion pictures and slides representing the activities of the museum, and the natural history of the Northwest and Minnesota in particular.

Dr. C. O. Rosendahl took the group through the Library and Herbarium of the Botany Department and spoke as follows in demonstrating the working material as shown:

"On account of the fact that the work of the Botany Department is given in four different places on the campus only a part of the working equipment of the department could be inspected in the Animal Biology building. Chief interest centered on the library and herbarium. The library is fortunate in possessing complete sets of the principal botanical periodicals of the world together with a fairly representative collec-

tion of miscellaneous works. A fine collection of old herbals, including those of Brunfels, Bock and Fuchs has been gotten together and many other valuable old volumes and sets are included.

"The herbarium is one of the five or six largest in the country being particularly rich in North American and European plants, but somewhat deficient in tropical species. The collections are arranged on a simple and very workable basis so that specimens can be located expeditiously. Plants from different continents and in some cases from particular states or provinces are kept in different colored folders so that a glance at the contents of a case will reveal where the specimens have emanated from. All the plants from Minnesota, for example, are kept in red folders and anyone desiring to check over the Minnesota flora is greatly aided by this color scheme.

"Private collections, acquired either as donations or through purchase are for the most part distributed throughout the general herbarium but the sheets are either stamped or labeled so as to indicate their origin. The Holway collection of Uredineæ and the Congdon collection of California plants are kept distinct.

"Most of the additions to the herbarium at the present time are acquired through exchange since adequate funds for purchases are not provided."

Botanical Excursion to the Minnesota River Valley.

The excursion to the Minnesota River Valley, scheduled to start promptly at 8.30 from the Pharmacy Building got under way as soon as Youngken, Viehoever, Petry and one or two others had had their breakfast—around 10 o'clock A. M. more or less. The Minnesota River Valley at Savage was chosen as the objective of the excursion because of the richness of the vegetation and as illustrative of certain interesting features of plant distribution.

The area traversed is characterized by a variety of habitats ranging from the prairie condition of the railroad right-of-way, to rich river bottoms, moist peaty meadows, stream beds, boulder strewn ridges, densely wooded north-sloping hillsides and deep ravines.

The sloughs and bottomlands of the Minnesota have a dense growth of reeds—(Phragmites communis), Wild rice—(Zizania aquatica), cat tails, bulrushes, sedges, composites and other rank forms. Abbreviated members of the party were frequently lost in the jungle-like growth. A very interesting feature of the peaty meadows is an elevated boggy area where the pitcher plant—in Minnesota typically an inhabitant of tamarack swamps—grows out in the open. Associated with it are found Triglochium maritimum, Lobelia kalmii, Potentilla fructicosa and Tofieldia sp.

In some parts of the meadow Cypripedium candidum grows in great profusion and here and there one encounters two other species of lady's slipper, *viz.:* Cypripedium hirsutum and C. parviflorum.

The ravines along the south border of the river valley harbor a profusion of species characteristic of the rich deciduous forest. In these places abound lady fern, interrupted fern, maidenhair fern, virginia grape fern, bloodroot, bellwort, wild ginger, hepatica, spikenard, showy orchid, jack-in-the-pulpit, yellow violets, sweet cicily, snake root and several other species occurring typically in the dense shade of oak, elm, baswood, maple, ironwood and dogwood.

The morning and afternoon sessions on Thursday were devoted to field work under the direction of Dr. Rosendahl and Dr. Brown. Opportunity was provided for collecting herbarium material and living specimens of medicinal plants. About thirty of those in attendance took part in the field work, automobiles being provided for conveying the party about twenty miles to the region where the work was done.

Following the field work the party returned to the city and spent some time in preparing herbarium material collected and packing medicinal plants for shipment home.

During one of the sessions a number of botanists including Professor Petry and Dr. C. C. Plitt made another field trip with Dr. C. O. Rosendahl. In commenting on this trip which was especially devoted to the collection of pollen, Dr. Plitt stated: "I was surprised at the dearth of lichens in the vicinity of Minneapolis, especially so in the dune region north of the city. Here is a region that is well illuminated, also well watered, yet not a lichen."

III.

THE AMERICAN NATIONAL RESEARCH COUNCIL.

By H. W. Youngken.

At the request of ex-President Woodrow Wilson the National Research Council was established early during the participation of the United States in the World War (1916) by the National Academy of Sciences under its Congressional Charter with the object of co-ordinating the research facilities of the country for scientific work on problems of war. In 1918 by Executive order it was reorganized as a permanent body.

The N. R. C. is a co-operative organization of American men of science including in its membership a representation of diversified interests in the pure and applied sciences. Its purpose is to promote and co-ordinate scientific research and disseminate scientific knowledge to the end of augmenting the strength and well-being of the nation.

During the war period, the National Research Council was partly financially supported by the government and for the greater part engaged in activities of direct aid to the government. It is now financially supported from sources other than those of our government. Among the donors might be mentioned (1) The Carnegie Corporation of New York which contributed $5,000,000 for the housing of the Council and the National Academy of Sciences in a suitable building in Washington as well as for a permanent endowment of the Council; (2) the Rockefeller Foundation which contributed $750,000 and the General Education Board which gave $250,000 for the maintenance of research fellowships in physics, chemistry, and medicine. In addition, about $200,000 was obtained from a number of individuals for the purchase of land upon which the Council and National Academy building was to be erected.

Just recently the Rockefeller Foundation has made available to the National Research Council an additional sum of $325,000 for the promotion of research in the biological sciences, including Zoology, Botany, Anthropology, and Psychology by post-doctorate research fellowships.

Additional contributions have been made by a number of concerns for the support of special scientific projects. The

Council has adopted various methods of giving assistance to science in America. As illustrative of these I mention the following: The direct maintenance of university research fellowships, the publication of valuable scientific papers, the preparation of bibliographies and abstracts of current scientific literature, the establishment of a bureau of information where research workers may secure reference data, the establishment of committees of chosen experts for specific scientific problems who plan modes of attack and endeavor to find men and money for carrying out the work and the bringing together of industrial concerns which are interested in the scientific development of their processes and inducing them to financially support special investigations under the advice of the Council's experts.

At present the Council is entirely controlled by its own membership and officers which have been selected as representative of a wide field of scientific activity. Included in and constituting the greater part of its membership are appointed representatives of nearly fourscore of the leading scientific and technical societies of the country.

The Council contains two groups of major divisions. One group comprises seven divisions of science and technology, these being respectively named and representing (1) physics, mathematics and astronomy, (2) chemistry and chemical technology, (3) biology and agriculture, (4) medical sciences, (5) psychology and anthropology, (6) geology and geography, and (7) engineering. The other group is constituted of six divisions representing (1) general relations, (2) government relations, (3) state relations, (4) educational relations, (5) research extension, and (6) research information.

Each of these major divisions comprises a series of committees, each of which has its special field of attention. For instance, the Division of Biology and Agriculture has committees on the Atmosphere and Man, Biological Relations of Insects to Flowers, Fellowships, Forestry, Infections, Abortion, Pharmacognosy and Pharmaceutical Botany, Food and Nutrition, and Publications. Some of the committees have subordinate subcommittees. In addition, this division also has committees on co-operation from leading scientific societies interested in natural history.

At the present time pharmaceutical interests are represented on the Council by the Committee on Pharmacognosy and Pharmaceutical Botany of the Division of Biology and Agriculture and by the sub-committee on Pharmaceutic Chemistry of the Division of Chemistry and Chemical Technology.

As chairman of the Committee on Pharmacognosy and Pharmaceutical Botany, I feel officially qualified to speak only of its history and present aims.

This committee was established by the Executive Committee of the Division of Biology and Agriculture, April 22, 1923, as a result of the work of a committee affiliated with the Council and known as the Committee on Co-operation of the A. Ph. A. with the National Research Council. The Committee on Co-operation was the outgrowth of a series of communications and conferences extending over several years which representatives of American pharmacy had with officers of the National Research Council and as a result of a distinct need felt by the pharmacognocists and pharmaceutical botanists of America for the co-ordination and development of their research interests on a high plane. The following constituted the personnel of this committee which was appointed by the Council of the A. Ph. A. and received by the division of the Council: H. W. Youngken, chairman; H. H. Rusby, E. N. Gathercoal, Arno Viehoever, and E. L. Newcomb. It was early felt by the members of this committee that while recognition had been received from the Council for Pharmacognosy and Pharmaceutical Botany it was nevertheless apparent that its status was such that it could only suggest rather than direct problems desiring attention, that to undertake the work of co-ordinating and initiating research in its field, it would require both the moral and financial backing of the Council and that by being an integral part of the Council its potentialities would be greater and pharmaceutic interests best served.

On the twentieth of March, this year, the A. Ph. A. Committee on Co-operation formally applied to the Executive Committee of the Division of Biology and Agriculture of the N. R. C. for recognition as a Committee on Pharmacognosy and Pharmaceutical Botany of this Division of the Council, and on the twenty-second of April the Executive Committee of the

N. R. C. Division voted affirmatively on this application. Moreover the entire personnel of the old A. Ph. A. Committee on Co-operation was elected as members of this Committee for one year.

We are now in position, we believe, to accomplish greater things. But to do this we will need the active co-operation of each of you as well as the numerous other workers in pharmacognosy and related fields.

During the four months of our existence we have been preparing a program of action which will be definitely acted upon at our initial meeting here in Minneapolis tomorrow night. Some of the contemplated objectives being considered are (1) a survey of the present and possible future sources of native drug plants, (2) a census of current research work and (3) the issuance of a news letter or bulletin containing information relative to problems deserving attention, current research in pharmacognosy and pharmaceutical botany and a questionnaire.

But this committee has done more than plan. It has already compiled a census of research in its field for the past year which will no doubt appear in a future publication of the National Research Council.

Its prognosis at present is healthy and cheerful. Its future accomplishments will rest upon the faithful co-operation of American research workers in the fields it was created to serve.

Various points brought out in the address were later discussed by E. L. Newcomb, A. Viehoever, Anton Hogstad, Professor Petry, and E. N. Gathercoal.

In the discussion of the work of the National Research Council, as far as it relates to pharmacy, pharmacognosy and plant science in general, Dr. Viehoever emphasized the need for a census of research, and workers in these fields. Second, a need for knowledge where schools and laboratories adequately equipped for research along these lines might be found or established. Third, the need for greater development and utilization of medicinal gardens and pharmaceutical experiment sta-

tions. Fourth, the need for larger research funds and more fellowships and finally, the need for full presentation of plant science and pharmacognostic interests in national research institutes, both in this country and those in the tropics.

IV.

DEMONSTRATIONS OF MICROSCOPIC AND MICRO-ANALYTICAL METHODS.

The remaining two hours of the seventh session were devotd to demonstrations in micro- and macro-sublimation and micro-chemistry. Under the latter heading the detection and identification of calcium oxalate and silica as plant constituents was taken up.

Dr. Viehoever discussed his work and that of his coworkers on Sublimation of Plant and Animal Products, a publication which appeared in the *Journal of the Association of Official Agricultural Chemists,* Vol. 6, 1923, pages 473-481. In this article a new sublimation flask is described, which was found useful for the sublimation of minute amounts as well as quantities sufficient for quantitative analysis. Furthermore, a micro-melting point apparatus was mentioned which has been used with great satisfaction in experiments dealing with the identification of crystalline sublimates. Both apparatus were demonstrated.

He also referred to specific examples of successful sublimation such as of santonin, which was discovered in domestic species of Artemisia after examination of over fifty species (see "New Sources of Santonin," in *Journal of the American Chemical Society,* Vol. 45, 1941-1944, 1923).

Illustrations of one of these species of Artemisia were shown, as were also domestic beetles, in which Cantharidin had been found, among them, especially Macrobasis albida, with more than five per cent. of free and combined Catharidin sublimed directly from the slightly acidified beetles. (See J. of Official Agricultural Chemists, Vol. 6, pages 489-492, 1923).

Dr. Viehoever in conclusion suggested the more extended application of the methods consisting of sublimation under con-

trolled conditions of temperature, air pressure, and time for the isolation, identification and purification of many crystalline and sublimable plant constituents. He stated that he himself expected to continue this work and intimated that he would report further progress at the Asheville meeting of the American Pharmaceutical Association.

Following Dr. Viehoever a new sublimation apparatus developed at the Minnesota State Dairy and Food Department was exhibited.

A paper given by Julius Hortvet, of the Minnesota State Dairy and Food Department, traced the development of sublimation apparatus from the simple arrangement of two watch glasses through the various types employing inert gases and vacuum up to the latest type of sublimator. This apparatus consists of a sublimation cell of pyrex glass and a special heater so arranged as to permit qualitative, quantitative and micro-sublimations under definite pressure and temperature control.

A demonstration of the Hortvet Sublimator was made by Cady S. Corl, of the Minnesota State Dairy and Food Department, showing the manipulation of the apparatus for the quantitative determination of salicylic acid and other preservatives in foods and drugs and for the micro-sublimation of arsenic and other poisons in toxicological analysis.

A demonstration of the Hortvet Universal Cryoscope was also given by Mr. Corl. In this experiment ethyl ether and liquid air were both used as refrigerants. It was clearly shown, by determinations of the freezing point of hydrogen peroxide and various alcohol-water mixtures that the field of cryoscopic analysis is not limited in any way to pure academic work nor to milk analysis. The freezing point of liquid reagents was shown to be more easily determined than the melting point but the apparatus provides, however, an easy way for the preparation of samples and subsequent melting point determinations on those substances which are liquid at room temperature.

Mr. G. L. Keenan next took charge of the demonstrations and instruction relative to calcium oxalate.

The Optical Identification of Calcium Oxalate Crystals

The method employed for the identification of calcium oxalate crystals in crude drugs was described in detail. This method consists in the application of optical-crystallographic measurements by means of the petrographic miscroscope and the immersion of the material to be studied in liquids of known refractive index. The specimen of crude drug to be studied is reduced to powder and a minute quantity placed on a microscope slide. Calcium oxalate monchydrate having three indices of refraction which can be determined, *viz.*, a minimum, intermediate, and maximum value designated as alpha—1.490, beta—1.555, and gamma—1.650, respectively, the material on the slide is moistened with a tiny drop of the liquid having the refractive index 1.650. This liquid consists of monobromnaphthalene to which a very little monochlornaphthalene has been added. The cover glass being applied, the preparation is then examined under a miscroscope provided with a revolving stage, nicol prisms, cross-hairs in the eyepiece parallel to the vibration-planes of these nicols, and a substage diaphragm. Crystals are located in the plant tissues by searching the slide with the nicols crossed so that the greater part of the field is dark. The crystals or fragments of crystals of calcium oxalate are readily picked out by their polarization colors, which consists of faint greenish or pinkish tints. A crystal or crystal fragment is centered in the field, and turned to extinction position, that is, until it becomes dark; the upper nicol prism (analyzer) is withdrawn and the substage diaphragm partly closed. In some cases the crystal would then be invisible, showing that its refractive index in that particular crystallographic direction is matched against that of the liquid (1.65). [On raising the microscope tube slightly, a band of light is seen to pass into that substance—crystal or liquid—having the higher refractive index in that direction. The more divergent the indices of the two, the more brilliant the band; while when they are nearly matched, the band becomes faint, and if ordinary light (white) is used, pale blue and orange margins are shown about the crystal.] In case the crystal is still visible when the analyzing nicol is withdrawn and the diaphragm partly closed, the stage is rotated through ninety degrees and the crystal again observed. In some cases

it would disappear in this position, again giving the location of highest index (1.65) for calcium oxalate; but in other cases it would remain clearly visible in all positions, and on raising the tube of the microscope slightly, a band of light would be seen to spread out from the crystal into the liquid. This demonstrates that the crystal observed happens to lie in such a position that the directions of the other, or lower indices, are indicated instead of the higher one.

Having established in this manner the presence or absence of crystals showing the highest refractive index for calcium oxalate, this same process is repeated with immersion liquids made up to match the other two refractive indices, alpha ( ) —1.490, and beta ( )—1.555. The first liquid consists of a liquid petrolatum made from California petroleum and sold for medicinal purposes; the second liquid is a mixture of about six parts of the petrolatum with four parts of monochlornaphthalene. When crystals match either of these liquids, or the highest index liquid the substance is readily identified as calcium oxalate monohydrate.

Resorcin Test for Calcium Oxalate.

In addition to the optical methods described by Mr. Keenan for the identification of calcium oxalate, Dr. Viehoever also mentioned the use of resorcin—sulphuric acid, which reagent gives an intense blue color with oxalic acid or calcium oxalate. Concentrated sulphuric acid is added to the substance to be tested and then resorcin in amounts sufficient to bring about the test in check experiments with oxalic acid.

This test was referred to in an article entitled "The Pharmacognosy Laboratory," cit. published in the *J. of the A. Pharm. Assoc.*, Vol. 6, page 721, 1919. It was subsequently published and discussed in detail by Dr. Chernoff in the *J. of the Am. Chem. Society.*

Silicic Acid.

With respect to silica Dr. Viehoever referred to Molisch's work identifying certain plant structures, especially those containing silica by the structure of the elements after ashing and the formation of characteristic crystals of sodium or potassium fluor silicate upon treatment with hydrofluoric acid.

Qualitative Microscopic Analysis.

The eighth session was opened with a discussion on reagents for microscopical work. The several reagents which had been voted for inclusion in the new Pharmacopœia, namely, iodine and potassium iodide solution, chloral and glycerin solution and phloroglucinol solution, were considered and their inclusion in the U. S. P. as standard reagents approved.

Professor Gathercoal presented the formulas of the above test solutions, viz., chloral and glycerin solution—hydrated chloral 50 gm., water 15 c.; glycerine 10 cc.; iodine and potassium iodide solution—iodine 0.50 gm.; potassium iodide 1.50 gm.; water 25 cc.; phloroglucinol solution—phloroglucinol 0.50 gm.; alcohol 25cc.

In illustration of a non-uniform test solution used in the U. S. P., he directed attention to the use of copper acetate solution as employed for the detection of rosin in asafœtida, balsam Tolu, benzoin, guaiac, oil of cassia and oil of cade. The strength of the test solution in one case is 1 part in 20 parts of water, in another 1 part in 100 parts of water, in another 1 part in 200 parts and in three instances 1 part in 1000 parts. Also the method of applying the test varies most widely. He stated that an extensive piece of work by Mr. Elmer H. Wirth in the Pharmacognosy Laboratory of the University of Illinois School of Pharmacy indicated that a uniform test solution 1 part in 200 parts of water, and a uniform method could be advantageously used for the detection of rosin, not only in all of the drugs named, but in many others, such as American styrax, Levant styrax, damar, shellac, myrrh, dragon's blood, jalap resin, balsam peru, scammony resin, etc.

In the discussion a number of other reagents were proposed for inclusion in the U. S. P., and several modifications of the formulas presented were suggested. It was indicated that only those test solutions which were specifically mentioned in the monograph texts should be included.

The formula of the proposed iodine and potassium iodide solution corresponds exactly with iodine test solution, page 535, U. S. P. IX, but the thought was expressed that a much weaker iodine solution, practically an iodine water would be desirable for the coloring of starch a faint blue.

The phloroglucinol solution as proposed is two per cent.

in alcohol while the phloroglucinol test solution (page 543, U. S. P. IX) is three per cent. It is a question whether the three per cent. solution would not be satisfactory for microscopical work, especially as it is mixed with an equal part of hydrochloric acid when so employed. The coloration and deterioration of phloroglucinal solution when kept for some time was discussed. Dr. Newcomb's samples of the solution kept for two years and apparently without any deterioration when used as a reagent for lignin. It was suggested that a statement be added under phloroglucinol test solution to the effect that when employed for the detection of lignified cell walls in microscopical work it is to be freshly mixed with an equal quantity of hydrochloric acid.

Some objection was made to the presence of glycerin in chloral solution, as it retarded the clearing action of the chloral hydrate. The consensus of opinion seemed to be in favor of retaining the glycerin in this test solution and to employ a special solution of chloral hydrate in water only for rapid clearing effect.

Dr. Viehoever expressed himself as in favor of adopting even for inclusion in the Pharmacopœia, a set of specific reagents for the identification of wood, cork, sieve tubes, and of such reagents which are generally agreed to greatly facilitate the examination and identification of tissue elements or cell contents, at least of official drugs. He mentioned among others the sudan-glycerin test for suberin of cork and the use of brilliant blue for staining the callose of sieve tubes.

E. B. Fischer and E. L. Newcomb next made a demonstration on the desirability for a United States standard micrometer scale. Thousands of figures representing measurements of microscopic elements were presented. It was pointed out that the dimensions of miscroscopic elements as given in the present Pharmacopœia had, for the most part, been found to be correct. In a few cases rather wide discrepancies were found. Attention was called to the possibility of a variation between the micrometer scale supplied by different manufacturers.

In discussing this subject, Professor C. C. Plitt said:

> "I have always been under the impression that there was no question about the accuracy of the stage microm-

eter, however, I recall an experience in this connection. Sending a friend specimens of lichens, I found that his measurements of the spores were invariably larger than mine. Might this not have been due to the fact that the two stage micrometers were not ruled alike?

"Regarding the measurements of starch grains, crystals, etc., which would be the proper way of stating the sizes in the Pharmacopœia? Naturally, there are only a few representatives of the very smallest and of the very largest sizes. I think, however, that cognizance of these should be taken, with the further statement, that the average size is between, giving here the sizes which will take in the greater number."

This session was closed with demonstrations by Dr. H. W. Youngken and Dr. Keenan on methods of quantitative microscopic analysis.

Quantitative Microscopic Analysis.

The methods used in quantitative microscopic analysis were considered in detail and the principal ones discussed were those employed by the Bureau of Chemistry in their examination of flour and pyrethrum powder. The necessary apparatus and the technique to be followed in the quantitative microscopic examination of flour may be described as follows: A microscopic slide with ruled lines about ½ mm. apart is used and the 5-milligram portion of flour transferred to this slide and 3 or 4 drops of chloral hydrate solution added. The flour being evenly distributed in the menstruum with a preparation needle, a square cover glass (22 mm. square) is applied and the slide gently heated until it is sufficiently cleared. The slide is allowed to remain a short time before the actual quantitative work is begun in order that any currents caused by heating may not interfere in the counting of the slide.

The actual quantitative work on a slide prepared in the manner already described consists in the enumeration of the wheat bran particles and hairs ordinarily found, in varying amounts, in different classes of flours. The slide is slowly moved by means of a mechanical stage, and all of the bran particles, hairs, and fragments of hairs counted, beneath the cover glass as well as along the margins of the same. Each fragment of bran and hair is given a value of 1, the final number obtained being taken as the value for the flour in question.

The quantitative examination of pyrethrum powder for the detection of daisy flower tissues is carried on in a somewhat similar manner, a few modifications being made in the method to suit the material to be examined. Standard reference samples of pyrethrum powder containing known amounts of daisy flower tissues are prepared and counts made of certain diagnostic tissue elements in the daisy powder. The sample in question is then counted in a similar manner and compared with the counts made on the standard samples. In this manner an estimation of the approximate amount of the adulterant present can be made.

In connection with Dr. Youngken's use of the dark colored resin vessels in the bract fragments of the daisy flower head to determine the amount of adulteration in insect powder, Professor Gathercoal called attention to the fact that the varied size and shape of these fragments might lead to a marked discrepancy in results. Dr. Youngken stated that the powders under comparison should be of a uniform degree of fineness. Dr. Newcomb stated that his experience in connection with milling led him to believe that different mills produced fragments of tissue of different form and shape. The principle upon which the mill operated resulted in variation in the disintegration of the tissue. He felt that a uniform method of preparing powders for qualitative microscopic work was essential in order that standard samples might be prepared. When this was done concordant results by different workers might be hoped for.

Dr. Viehoever took part in the discussion of quantitative microscopic analysis referring especially to A. Meyer's method described page 130 in his book entitled "Die Grundlagen und die Methoden für die Mikroskopische Untersuchung von Pflanzenpulvern 1901." Meyer recommends the use of a counting chamber which in the examination of starch for instance, is filled with a mixture which contains 1 mg. carefully dried starch in 50 ccm. of glycerin. The number of starch grains which are found in sixteen squares of the counting chamber represent Meyer's "Normal zahl" (Basal number). Meyer determined this number for several starches, such as rice and corn starch and applied the method to mixtures. Bredemaun subsequently applied Meyer's method to practical problems such

as the quantitative examination of rust spores in flour, etc. Dr. Viehoever also referred to one method suggested for the quantitative determination of ergot in flour. The ergot particles in a given quantity of powder mounted on a ruled slide are drawn to scale on a cardboard. The pieces of the cardboard, representing the sizes of ergot particles observed, are cut out and weighed. The method, further described in Gadamer's book on "Toxikologie" is stated to have given fair results. Viehoever then called attention to his own method developed for the quantitative determination of bacteria published under the general title: "Botanische Untersuchung harnstoff-spaltender Bacterien," *Centralblatt f. Bacteriologic,* II Abt., Vol. 39, 1913, No. 8/14.

He used copperoxideammonia to remove the slime responsible for the clumps of bacteria and added methylene blue for staining and better differentiation. An addition of small amounts of hydrochloric acid decreased the Brownian movement. This method, though it proved very satisfactory, seems very little known as yet.

(*To be Concluded.*)

THE ROMANCE OF INSULIN.

"Taking the Die Out of Diabetes."

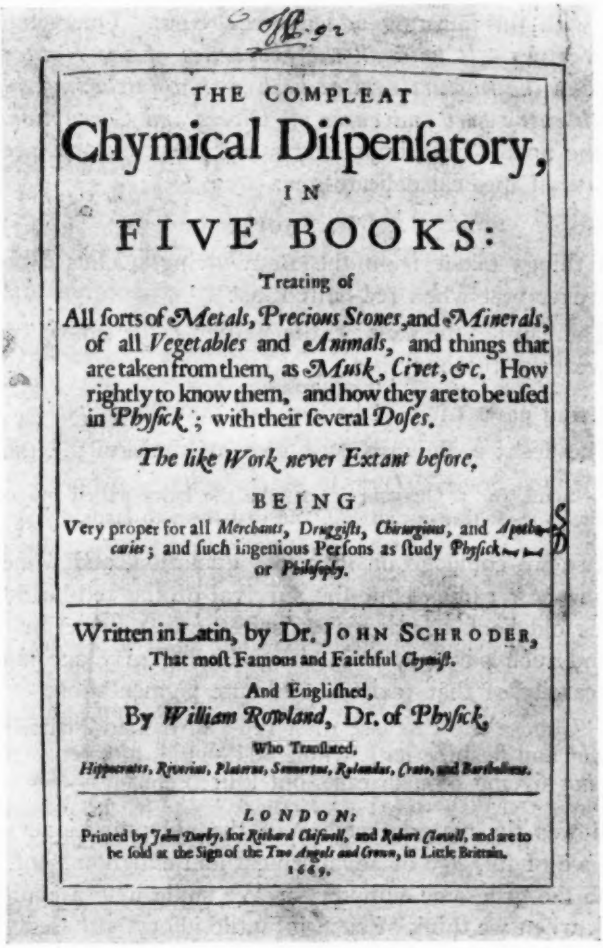
Ivor Griffith, P. D., Ph. M.

Physiological Chemist, Stetson Hospital of Philadelphia; Assistant Professor of Pharmacy, Philadelphia College of Pharmacy and Science.

In 1692 William Penn sat down in his house in Philadelphia and wrote his initials upon the fly-leaf of the Dispensatory, or Medical Formulary, which is now upon the writing-table here, "William Penn, Proprietor of Pennsylvania, His Booke." Proprietor of Pennsylvania! He also expressed his confidence in his medical *vade mecum* by adding his initials to the last page of the old tome. But Penn's confidence is not of a class with the confidence of one William Rowland, "Dr. of Physick," author of the book, who introduces his offerings as "the Like Work never Extant Before"—proud old author—long since returned to silent, inorganic dust, but whose tongue yet wags in merry printed converse.

And what a book it is, full of naivete and charm, and writ in that sweet old English that breathes and pulsates like a living thing. The boldness of its statements and the guileless way with which it disposes of things of great moment, call for naught but admiration.

But admiration turns to awe when we delve further into the text and come upon grotesque methods of treating disease, and upon vile formulas whereby the apothecary and "chymist" are guided in concocting their elixirs, balsams, unguents and magisteries.



THE COMPLEAT

Chymical Diſpenſatory,

IN

FIVE BOOKS:

Treating of

All ſorts of *Metals*, *Precious Stones*, and *Minerals*, of all *Vegetables* and *Animals*, and things that are taken from them, as *Musk*, *Civet*, &c. How rightly to know them, and how they are to be uſed in *Phyſick*; with their ſeveral *Doſes*.

The like Work never Extant before.

BEING

Very proper for all *Merchants*, *Druggiſts*, *Chirurgions*, and *Apothecaries*; and ſuch ingenious Perſons as ſtudy *Phyſick* or *Philoſophy*.

Written in Latin, by Dr. JOHN SCHRODER, That moſt Famous and Faithful *Chymiſt*.

And Engliſhed, By *William Rowland*, Dr. of *Phyſick*,

Who Tranſlated, *Hippocrates*, *Riverius*, *Platerus*, *Sennertus*, *Rolandus*, *Crato*, and *Bartholinus*.

LONDON:

Printed by *John Darby*, for *Richard Chiſwell*, and *Robert Clavell*, and are to be ſold at the Sign of the *Two Angels and Crown*, in Little Britain. 1669.

"Take thou," commands the Book, "the Brains of a young man under twenty-four, that dyed vyolently, with all its Membranes, Arteries, Veins and Nerves, with all the Spinal Marrow, beat it, (which is mighty good advice to the feeble-hearted), and add Cephalick waters and Lilly-convals, four inches above; let stand awhile, then distil cohobation. Make a salt from the calcined residium and joyn on to the Spirit Vertues: It is a brave antiepileptich." To

which we add—that only an unusually brave epileptic would ever open his mouth to such a gruesome beverage.

But that is not all. Elsewhere we find mummy, dried and powdered, moss from a dead man's skull, elixir of urine, magistery of cat blood, foam from the mouth of a mule, and oil of Egyptian carcass, with this alluring addendum: "Note. Quercetan *takes it fresh.* Vertues. *It hath all the properties of the Natural Carcass Balsam, and the tincture exalted hath such a quickening quality that it pierceth every part and cures all Ulcers and Corruptions.*"

In the apothecary shops, states the Dispensatory, are the following arts of medical delicatessen:

IN SHOPS

Are things taken from the Body living, Genus Homo—man, which is ever best when red-haired, as:

1. The hair; 2. the nails; 3. the spittle; 4. the ear-wax; 5. blood; 6. the sweat; 7. the body-lice.

Or from parts of dead bodies, as:

1. The flesh; 2. the grease; 3. moss of the skull; 4. the heart.

NOTE.—Some for a Quartan fever take the hairs pulled out of the red-headed patient, roast them in an egg, and cast them to birds.

And so we could go on in merry quotation, and wondering all of the time how came about the survival of the red-headed fraternity. The old book has a wicked spite against the crimson-topped species and such paragraphs as the following may account for the current scarcity of that variety of hirsute pigmentation.

> "Choose the carcasse of a red-hair'd man (whose blood is thinner and flesh better), whole and sound, of twenty-four years old, not dyeing of a disease, but killed, etc."

Such was the materia medica of the old practitioners of physick, and we of this age of advancement and enlightenment, are horrified with the gruesome equipment. We smile with a cynical, superior smirk when we think of such infantile idiocy. "Essence of bone and spirit of blood"—idiocy we say—and yet the dapper young doctor who cares for our physical welfare today, is prone to affect the same style of treatment and often resorts to a kindred zoologic equipment.

Time was when crude botanic drugs from India's jungles or Africa's teeming wilds filled up the shelves of the old apothecary shop. Today the stockyards of the Middle West have claimed their

share of drug shop patronage. The bleating calf, the gentle sheep, slovenly sows and other children of the four-legged race, furnish a great bulk of the drug store's healing agents.

The day of "extract of menagerie" is still with us, even if the "elixir of botanical garden" is not longer the vogue.

To corroborate the old quip that history truly repeats itself, comes now *Insulin*, the latest addition to our animal armamentaria for fighting disease, for it also is an extract of quadruped. Surely the old formula scribes were not so silly after all.

Insulin is designed to fight the dreaded sugar sickness known as diabetes, and insulin after all is second cousin to spirit of bone and essence of blood, for out of the suckling calf came the original lot. Now, however, the chemists say that four legs are not prerequisites to insulin manufacture. Fishermen of the deep seas, who used acute invectives when the gullible skate or vicious shark mauled up their clammy bait, must now regard these finny things with more respect for out of them, say the chemists, will come anon the large supply of Banting's cure for diabetes.

Out of Canada came insulin,—product of the immediate mind of a young physician and associated chemists, who added together the sum total of many previous discoveries and found the answer in Insulin.

Who has ever watched beneath the teil-tale acreage of lenses well assembled, the growth of a perfect crystal, but cannot draw from it a parallel to the consummation of any great discovery, such as this unearthing of Insulin. Indeed the progress of a crystal in its growth from nuclear source, out of the depths of murky fluid, is always one of slow but dead-sure progress. Tiny particles, builders of every crystal, dance about in Brownian ecstacy, darting in all directions, searching eagerly for the first born nucleus. Finding it they come to rest beneath its ramparts. And from all directions they draw their cohorts to the coalescence, and only the proven pure can join their congregation.

Atom upon atom, particle upon particle, and sheath upon sheath, the crystal is built, gradual, orderly and certain. Finally facet, axis and edge, definite in every detail, announce with no mistake the form of a perfect crystal. And the dross, the foreign and colloid things are left behind in the fluid—only the actual, belonging things find room in the mass of the crystal. This finished crystal, so the physicist states, is now the large scale, accurate picture of each of its little atoms. Such, we say, is the tale of every invention in every

field of endeavor. Invention, indeed, rarely comes full blown, like Jove begat Minerva, but slowly like the gathering home of atoms to a naïve, attractive nucleus.

This was the story of Insulin. Yes, indeed, out of Canada came Insulin, but Canada after all, served only to gather the atomic truths astray and fetch them to their nucleus. For before Insulin came the cause of diabetes as had been found by other pioneers, and it had been definitely estabished as a dietary disease. But before it came, facts and fancies, truths and fallacies concerning it had long wandered about all over the world, with no determination. Physiologists the world over had spent long years of research looking for the cause of and a remedy for, this dreaded sugar malady. And each one of these searchers had contributed his mite to the growth of the eventual crystal.

Indeed many had come nigh into the threshold of the final light but found their trembling hands too weak to push aside the last obscuring curtain. Some had vainly spent long hours searching for a vicious germ, and even the immortal Pasteur had pointed a finger in that direction. But the disease not being communicable they soon realized that it could not have been caused by a germ. Others had looked for the cause in the kidney, blaming that filter for gumming the works. Then came a search through the liver, that highly important collection of cells. True enough, they found that the liver was indirectly interested in this diabetic question, but they soon knew well enough to give it also a clean bill of health.

Even the tiny blood cell came in for its share of the blame, and wise men labored without result looking for the cause of diabetes there. But every experiment carried its message and soon came the day when the last of the clues came home to form the final verdict. Not the kidney, not the liver, not a germ—but that obscure organ, sweetbread, to the epicure and pancreas to the doctor, was at last charged with the grave responsibility for all the terrors of the sweet but deadly scourge.

Fifty years ago the noted Claude Bernard invited the grins and grimaces of skeptical medicos by stating that certain internal influences in the pancreas were responsible for diabetes. He was given then what the slang-slingers today call the "merry ha-ha." He told them that the liver would take up the sugar from the food of the diabetic, change it into something called glycogen, and put it in storage to dole out as the muscles called for it. But in the diabetic

this sugar would not burn. And Bernard said the pancreas had missed doing something to it, and despite the critics persisted in his doctrines. Today brings proof of his clear vision.

Then came Minkowski, who tried it on the dog. More than fifty faithful Fidos fell beneath his testing skill, and he concluded after many operations that the pancreas, and the pancreas alone, afforded diabetes. Removal of that organ from its nest in the intestines at once gave rise to diabetes, and the dog minus its pancreas survived only a week or ten days. This experimental diabetes was a true diabetes with all the usual symptoms, such as unquenchable thirst, unreasonable appetite, rapid decline of strength and loss of body structure—that aggravating, heretofore hopeless picture so well known to every doctor.

Fifty faithful Fidos were not enough for the meticulous Minkowski, who persisted in his clever experiments, until he proved beyond doubt the guilt of the suspected pancreas. The most ingenious of all his experiments was the one whereby the pancreas of a dog was totally removed by a special procedure. In that animal the lowest portion of the pancreas is unattached, and lies free in what anatomists call the mesentery. Now with care this part of the gland can be taken out of the abdominal cavity without disconnecting the elastic pipes that bring and take away its blood supply. So Minkowski carefully transplanted this portion of the pancreas from its home in the belly cavity and grafted it (without cutting off the blood supply) under the skin close to the edge of the original incision in the abdomen. Then the dog was given a rest so that his wounds might heal. When recovery was complete the dog surgeon returned and "reopened his subject." He then removed the whole remaining portion of the gland so that the animal had left only that part of the gland previously grafted under the skin of the abdomen. The dog again recovered, but was not diabetic; indeed feeding large quantities of sugar to it gave rise to no diabetic symptoms. This proved beyond a doubt that the pancreas influenced the destruction or the simplification of sugar. It proved also that whatever the pancreas furnished it did so, not into the bowel where it released its other secretions but rather into the blood supply that passed through its interior.

Bunge, a contemporary scientist, drew this conclusion from Minkowski's brilliant findings: "We must assume," he states, "either that in diabetes the blood sugar undergoes some change in passing

through the pancreatic gland, or else that *the gland gives off some substance to the blood and tissues which enables directly or indirectly the destruction of the sugar in other organs of the body.*" He accepted as more correct the latter hypothesis, and so blazed the trail for the host of searchers after truth following in his climbing footsteps.

Thirty years ago, then, science knew that *"something"* given by the pancreas to the throbbing, ceaseless blood stream, kept the body's fires burning in their own consuming way. It also knew that lacking this *"something,"* the body lost its working balance and failed to use its food. The sugar of the food travelled through the body unchanged, working havoc everywhere it went. It worked its evil ways in two directions. Firstly, it increased the work of the kidney filters, for it clogged them with its syrup. Secondly, refusing to burn in the muscles it threw the responsibility of building the body fires upon the fats and proteins. Alone these fuels cannot work—they do their best, but their best only hurts the body. The burning of fats produces acrid, acid substances, and these are hurtful to the human plant. Not sugar alone, not fat alone, not protein alone, nor any two together, but all three *must* come to constitute the food or the fuel that supplies heat to the body establishment, energy or power to keep the parts of the body moving and working, and constitute also to the replacement of worn-out parts and to the growth of tissues.

One might well compare this business of fueling the human plant with that of fueling a factory. We well know that the coal that goes into the furnaces at the power plant supplies enough heat to keep the factory warm so that the workmen will not growl. We know that it also manufactures the power that runs the various huge machines; and lights the buildings up when darkness comes, and runs the fans that keep its air sweet and wholesome. These hidden energies are in the fuel. But before they may be obtained, however, the coal must be properly burned or consumed in fire, and to do this it must be of the proper size and quality to fit the furnace.

The same thing is true of the body. The food we eat is our coal that keeps the body warm, so that our working cells will not growl and go on strike. It also runs our huge machines, swinging arms and marching feet, pumping hearts and cerebrating minds, as well as the subtler powers that light up the body establishment and ventilate it so that its cellular inhabitants thrive and prosper. It has

many other functions such as the growth and repair of body structures and the replacement of worn out parts. Unlike the factory machine the body must formulate its own lost or strayed parts and it is out of food material that these missing parts are gradually evolved. "But that is another story."

Now this food must be burnt up in our furnaces in a certain way before it gives up its energy. It must be broken down into tiny pieces before it can be burnt. It must of course have the tendency to burn. Lumps of iron will not fire a factory furnace any more than lumps of undigested starch will fire the body furnace. Coal constitutes a good fuel because it burns sustainingly and rather completely. It does this because it contains some very combustible substances, others not quite so readily burnt up. It compares well with the requirements of body fuel in this respect, much better so than oil or wood fuel because the food or fuel of the body machine need also burn sustainingly. That is why we *must* have the three kinds of food fuel if the body is to survive, namely: fats and carbohydrates and the slow or non-burning proteins.

The chemist tells us that when coal is consumed in the absence of oxygen it yields coke (comparable to carbohydrate), the tar, full of hydrocarbons (comparable to the fat), and ammonia (comparable to the nitrogen compounds or proteins). So coal, after all, may be correctly compared to the three factors also so vitally necessary for body fuel or food. Coal will not burn consumingly unless it has air (oxygen), and neither will the body fuel. The energy of the coal in the furnace is not used up directly but rather through the medium of water, which it converts into the powerful steam, which in turn revolves the wheels that generate the electricity that lights the plant and runs its ventilating fans. The same thing might be said of the body furnace, for the energy of the fuel food is only transmissible through the function of the water in the body.

But let us consider the power plant just a bit further. Suppose something happens to the machinery of the furnace, or else we supply it with coal too large for its complete combustion. The result is that the coal clinkers up and refuses to burn properly. The whole plant suffers, the workmen complain of the cold and quit their jobs; the machines idle and even the filament of the light bulb flickers. Everything goes wrong. Production is curtailed and soon if some remedy is not produced, the plant ceases operation.

Take now the body furnace. Because of a strike at the coal

breakers, one of which in the body is the pancreas, the sugar fuel clinkers up and refuses to be consumed. What happens? The whole plant suffers, the workmen complain of cold and quit their jobs, machines that used to whirl and swing and march and pump and think, refuse to operate, and even the filament of the light bulb flickers—the eyes grow dim. Production is curtailed and soon, if some remedy is not produced, the plant ceases operation. The open grave invites its dissolution.

Diabetes, then, is a strike at the body coal breakers, the pancreas. Sugar molecules in the body of the diabetic, clinker up the system, for their lumps are too large for the fires of the body to consume. And when the sugars refuse to fire, the fats cannot burn in their flame, and the stubborn old proteins just pile up and stagnate.

That diabetes is a disease of civilization, occasioned, perhaps, by the introduction of sugar into the dietary is the nonsensical idea advanced by some writers. In an old book called "Sydenham's Processus Integri," we find the following passage, which dispels beyond a doubt this foolish notion:

> "Some authors say it (diabetic urine) hath a honey-like sweetness, but this I never found, although when it dries upon a linen cloth, when it has been thorow dry it has great stiffness. *Galen* says it is caused by a *Hot Intemperature* but *Paracelsus* says it is caused by the dissolution of a dry salt through mixture of another acute or sharp salt."

Old Docs Galen and Paracelsus may have known what they were talking about but they seem to be far over our heads in this day and generation. Yet they appear to have known of the existence of diabetes even in their remote days (Galen, 120-180 A. D.) and that was long before man added the juice of the sugar cane to his morning sip of coffee.

But now let us see why the carbohydrates supplied to the body are so necessary in this process of combustion, and how the coal breakers of the health economy reduce them to a burnable state. Starch, the reserve food of plants, constitutes most of the carbohydrates of the human diet. The molecules of starch as produced in the vegetable mines are large and complicated, unfit to burn because of their unwieldiness. Throw a little corn starch on the hot stove lid and see how it scorches but fails to burn in a hurry, show-

ing that its energy is tightly locked. Of course, if this starch was moist it would take still longer for it to be consumed.

The first step in the coal breakers of the body is to reduce the size of this starch molecule to lesser lumps. This it largely does with amylopsin, a peculiar hammering enzyme given off by the pancreas into the upper bowel, by converting the starch to dextrose, a sugar. Now throw a little sugar on the red-hot stove lid, and see how it burns with a brilliant flame, showing that its energy is not so tighty locked as in the starch. Moist sugar will burn much slower of course. The molecules of sugar, however, are still too large for them to ignite quickly and burn quickly, at least quickly enough to suit the body furnace.

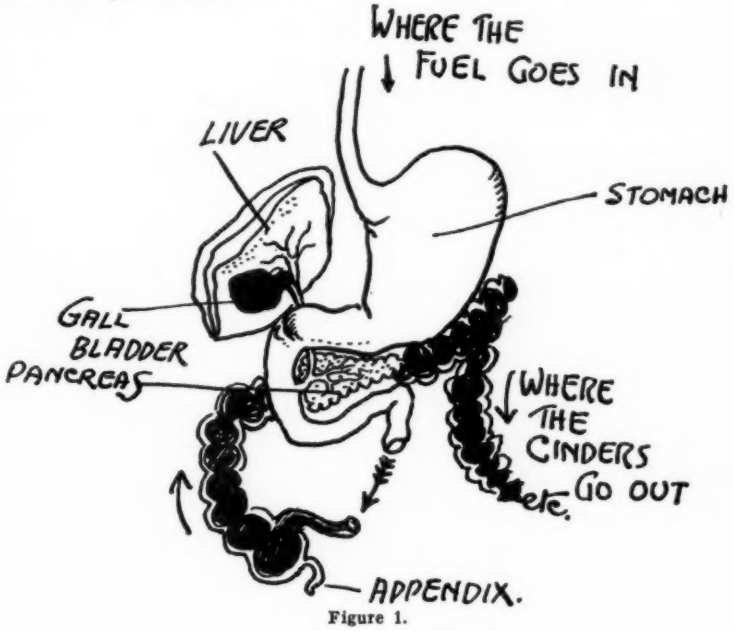


Figure 1.

Carrying this a bit further, outside of the body now, it is well known that we can take sugar in the moist condition, juice of grapes for instance, or of the sugar cane, and by letting it stand some time in a moderately warm place, it is changed by yeast, natural or added, into an alcoholic beverage. Sweet cider thus changes into hard cider, and hard cider is "hard" because it contains alcohol. This alcohol can then be purified in a still. The molecule of sugar has thus been pounded again to a much smaller size. Throw now a

half a teaspoonful of pure alcohol on the stove lid—it inflames before you pull your spoon out of the road. This alcohol will burn even when water is added to it.

There, then, is the secret of the body fire. Not indeed that the sugar in the body is changed to alcohol—but certainly into something similar to alcohol, something that will as readily burn, or be consumed as alcohol. Something that, while burning, will supply the body with the necessary warmth and at the same time give it sufficient energy to do its daily work. That, indeed, is the business of sugar in the blood and in the body.

Now, the yeast that turns our sugar into wine is a ferment—a sort of trouble-maker, that sends its enzyme servants right into the molecule of the prepared sugar, steals carbon-dioxide out of it, and leaves alcohol behind. Also this yeast has a dual function, for part of its energies go to the building up of the sugar molecule into a state suitable for fermentaton (inverts it, as the chemist puts it), while the other part of its energies go to the breaking down of these inverted sugars into their combustible alcoholic states.

Now the "something" secreted in the pancreas likewise appears to have a dual function, for it also seems to have the power of changing the course of sugar into two directions. First it builds it up into glycogen, which is the form used to store up in the body warehouses, the liver and tissues, for use, and against emergencies. It also can break it down into its combustible alcohol-like constituents. Indeed, while physiological science does not accept this opinion and probably never will, there is every reason for thinking it a good analogy. Science appreciates that these yeast secretions or enzymes, which it defines as the chemical tools of living cells, have often the power, outside of the body at least, of locking and unlocking, of storing and distributing, of building up and breaking down, and so they are sometimes styled "reversible enzymes." And why is it not logical to accept this analogy, for will not the same key lock as well as unlock a door?

The yeast secretion, then, that pounds the sugar of the body fuel into alcoholic-like material, and likewise builds it into glycogen, is a substance produced in the factory of the pancreas—in the islands of Langerhans, which is the anatomical name of that part of the pancreatic organ where this enzyme-like material is made. This enzyme-like material is *Insulin*, and like other true internal

secretions, it is broadcast into the blood stream directly and not into the bowel. (*Figure 2.*)

Diabetes, so named a long time ago from the Greek words meaning *to go through,* this because of the large amount of urine secreted by the diabetic, therefore might now be well defined as a disease produced in the body by a dearth or a complete lack of insulin. This insulin may be lacking because the pancreas is permanently injured, as in cancer, syphiiis or tuberculosis, or temporarily because of nerve shock or other condition. Again there may be insulin there, but not quite enough to care for all the sugar. Over-eaters often bring this condition upon themselves.

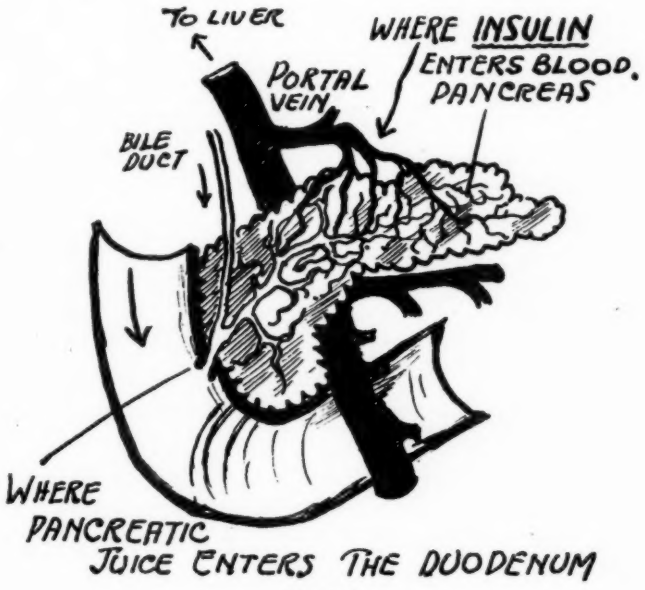


Figure 2.

The *per capita* consumption of cane-sugar in the United States, let alone other carbohydrates such as starchy foods, is nearly two pounds per week for every person, man, woman or child. This is a significant figure in connection with the increase of diabetes in our land. The astounding statement of a leading physician that when Americans learn to eat with moderation cancer and diabetes will become more rare is probably a well-founded fact.

Two facts, therefore, stared the Canadian experimenters in

the face. Fact No. 1. Upset of the insulin balance in the pancreas causes diabetes.

Fact No. 2. Insulin is locked up in the animal pancreas in that part of the organ known as the islands of Langerhans.

The first fact needed no further corroboration, for it was proven fact long before Banting even knew of diabetes.

The second statement provided the real problem. How can insulin be separated from the animal pancreas—how can it be shipped away from the islands? Banting and MacLeod and Best working together, finally answered the question. But the problem did not yield its solution without effort. For, as previously stated, the pancreas produces more than insulin, it supplies other enzymes directly into the path of food in the intestines. These are powerful digestive enzymes like pepsin and are external secretions, never really getting into the blood stream where insulin goes to do its work.

Naturaly many attempts had been made to treat diabetes by feeding dried animal pancreas to the patient. But they all ended in miserable failures, because in the process of digestion the insulin was apparently destroyed. So the Canada experimenters looked in another direction. What they desired was a way of coaxing the insulin out of the animal pancreas so that they might have it by itself, contaminated by no other influence.

But try as they would to extract the whole gland, all they got was the pancreatin or the external secretions. The insulin disappeared—evaporated—was lost. But, said Banting, "In the body Nature keeps the internal secretions away from the intestinal secretion. It must be that the pancreatin injures the other. Therefore, let us find a process that will keep them apart during their extraction."

That is what Banting did, and that is why the name of Banting joins the name of Lister and of Pasteur and other stalwarts in the hall of scientific fame. It was finally done by finding a combination solvent of such a nature that it held the external digestive principles in abeyance while the insulin leached out of the pancreas freshly drawn from a calf.

And with this discovery came the dawn of a new day. A heap of sadness went out of the world and man's burdens eased upon his weary shoulders. The old familiar dictum, "diabetics under twenty never live to see their twenty," lost its significance, and the devastating sugar sickness of life's long autumn was robbed of much of its poignant terror.

And so Insulin came to be separated as an uncontaminated pure "essence of blood." But then came the test. Lack of insulin causes diabetes—there was the dictum. "So?" said Banting—"and here is insulin to supply the deficiency." Again a whistle for Fido, that faithful old friend. "Treat him gently," said Banting, "according to this program."

Act 1. Out comes all of Fido's pancreas. His natural insulin factory is ruined forever.

Act 2. Fido is fed on bread and sweet coffee.

Act 3. Fido begins to fail despite his heavy meals, is becoming thin and emaciated, is ravenously hungry and thirsty—will probably die in four days.

Act 4. Tense moments. The problem that baffled the world's scientists for three decades is about to yield its answer. Banting fills a syringe with insulin and injects it into the abdominal tissues of pathetic looking old Fido.

Act 5. Fido improves steadily—begins to grow fat—capers about in great glee and licks Banting's hands.

Satisfied with insulin's behavior in the anatomy of Fido, the test was repeated on several of Fido's relatives, and the same remarkable results were noted there. These tests required many long months for their completion, but at the end of innumerable successful trials the experimenters felt confident enough of their discovery to take a chance with it in the hospital wards.

Somehow or other, despite all the precautions taken by the investigators, information concerning this new remedy had leaked into the ranks of diabetic sufferers, and when the preliminary human tests came to be undertaken, there was no want for experimental material.

A host of sufferers, emaciated but full of hope, waited without the gates of the temple and begged admission to the final testing altars. Out of them were selected a dozen advanced cases. Unlike Fido's case, there was no necessity to remove the pancreas, for disease had already done the equivalent of that. Tests were made first to determine the amount of sugar present in these persons' blood, and likewise the amounts secreted in the urine. Insulin was then injected and regular diets maintained. The results were identical with the results obtained in the animals. Soon the withered old bodies vibrated with action, stagnant blood revivified and swam about with more ambition, the tissue furnaces brightened as if a

blast of virile air had blown new life into their fires. The sugar that had previously dammed and damned their tired kidneys now went its normal way and left the filtering organs to their well-entitled rest. The excess of sugar in the blood was burned as proper fuel and plenty left to fill the liver storehouse. With proper adjustment of their diet the ten volunteers began to gain in weight, and better than anything else their morale came back. They wanted to get out and work. The miracle had been accomplished.

In short, insulin, put to test, exceeded every hope, fulfilled, and more than fulfilled all the predictions of the plodding workers whose blessed minds conceived its isolation. But their task is as yet unfinished. Behind them the joy of having found at last the diabetic's long-desired, much required, *aqua vitæ*. Before them the joy of searching for large scale methods of producing this panacea in such quantities as to let the rich and poor alike share in its healing blessing. In America alone a million sufferers waited the coming of the boon—and to this end the men from Canada worked incessantly on so that in the shortest possible time the largest possible amounts might be available. In order to do this they wisely sought the help of a firm well equipped in personnel and equipment to see to the large scale production of insulin.

In the United States the firm of Lilly and Company, founded by a graduate of the old Philadelphia College of Pharmacy, had long been held in high esteem. To them Banting turned. Together they patented the product, so that commercial fakes, sold under the prestige of the real article, might not flourish. This was for the protection of poor diabetics who might unsuspectingly repose their confidence in worthless quackeries and dangerous substitutes.

And indeed quackeries have appeared and continue to appear. One of the most reprehensible that has ever come to our attention is herewith submitted. That the manufacturers would have the effrontery to circularize physicians with such ridiculous asininity is beyond our comprehension. One pharmacist speaks of having received several calls for the quackery.

The lay-out which appears upon the next page is copied from a postal card sent by a Philadelphia concern to country physicians all over the land. It is characteristic of the blatant and idiotic claims put forward by persons who prey upon the weak and ailing.

FACTS NOT FANCIES:

DEAR DOCTOR:

When our agent calls upon you in a few days, he will gladly give you the names and addresses of the physicians who reported the following successful results with Capsules

INSULANS

Dr. C. S. M.:—Male, 73 years old, bedfast and declared hopeless by several physicians. Laboratory report 34% sugar. **Capsules Insulans** reduced this to 17% in 30 days and one month later to 7%. Patient on his vacation feeling fine.

Dr. W. F. W.:—Male, with 38% sugar, reduced to 3% in two months with **Capsules Insulans.**

Dr. E. L. H.:—Female, two years treatment, 14% sugar. In 8 days she was sugar-free under the administration of **Capsules Insulans.**

Others, too numerous to mention, will be cheerfully mailed upon request.

BE SURE AND SPECIFY

CAPSULES INSULANS

Here are nonchalantly recorded two human beings who are veritable refineries, producing simple syrup at the inhuman rate of a gallon or two a day. Sheer nonsense!

Returning to the manufacturing on a large scale, we find that it did not take long to solve the production problem when the Yankee chemists got to work. "Leave it to the Yankee to do everything big," a bit of vernacular, we admit, but like most slang, very tersely and honestly put.

Soon enough Lilly had insulin on the therapeutic map. Every stockyard in the country got a chance to do its bit and shortly, out of the Lilly laboratories in Indiana the product streamed in endless vials and at a comparatively reasonable price. It was released into the hands of the medical profession and never before in the history

of medicine had the introduction of a new drug been thus accomplished. Indeed not since Ehrlich concluded his search and found his famous 606 had anything really startling happened in the realm of therapeutic discoveries until insulin came. Here and there, of course, a valuable medicine came to light, but nothing developed in the way of a truly specific remedy.

But more romantic even than the birth of insulin is the tale of its quaint introduction. Salvarsan was launched in the usual way, monopolized, price protected and deftly capitalized. Sufferers from the unspeakable disease helped swell the conscienceless coffers of salvarsan's clever backers. The very fact that the pre-war cost per ampule was five to ten times the present cost is proof aplenty of the heartless profits that came to the German promoters; and this capitalization continued long after a large scale production had brought the manufacturing cost of the material to a negligible figure.

But not so with insulin. In a recent issue of the *International Clinics,* a reputable and valuable medical quarterly, a tribute appears to the method of introducing this remedy to the profession.

This article states as a fact that at one time the only two reliable preparations of insulin manufactured on this continent were those made by the Connaught Laboratory in the University of Toronto, and by an American pharmaceutical house. The latter concern was selected by the University of Toronto to manufacture and distribute insulin in the United States, and they deserve great credit for their conservatism and for their strict honesty in placing it on the market.

> "For at least six months," continues the writer, "before placing insulin on the market they furnished it gratis to about twenty-five clinicians in the United States, who were selected by the Toronto investigators as being prepared to make blood-sugar and other clinical tests on diabetes with the view of determining the dosage, the effects, the indication for, and the limitations in, the use of insulin in diabetics. These clinicians were pledged not to publish their reports until the Toronto investigators felt there was sufficient data to justify announcing to the medical profession that insulin is of known therapeutic value in the treatment of diabetes. The reports of the use of insulin in a large series of cases by the Canadian, and some of the United States clinicians, were then published in the medical journals. Insulin, therefore, may be said to have passed the experimental stage, and it can be stated as a fact that its use is the greatest advance ever made in the treatment of diabetes.

"Both of the institutions concerned went to a great expense in developing methods of purifying and standardizing insulin, and up to this time they both have actually lost money on the insulin that they have manufactured. The price now charged, less than three cents per unit, is below the cost of production, but it is still very expensive. The average adult daily dose of thirty units costs the patient, for insulin alone, a little less than a dollar a day.

"Contrary, then, to the German method of exploiting new discoveries in drugs and biological products, the public will be protected in the cost of insulin. The University of Toronto patented the product to insure its reliable manufacture and distribution and their contracts with the American producer provides that the originators of insulin can control the price and that it shall be sold practically at cost, with only a nominal royalty to the University of Toronto, to be used for research in its laboratories. Banting, the discoverer of insulin, has not and will not profit one cent by its manufacture and sale. However, the Parliament of Ontario, in recognition of his service to mankind, has appropriated sufficient funds to endow a Department of Medical Research in the University of Toronto, in which Banting has been given a professorship."

Yet there are those who say that there is no conscience or ethics in any commercial endeavor. Past practices in this particular field on the whole, justify such a contention. Far better, however, than any former effort is the experiment that introduced insulin, for it has already made it possible for the poor as well as the rich sufferer from the dread diabetes to share and share alike in the blessings of this truly remarkable drug.

At the present time several other reputable pharmaceutical concerns, such as the world-famous Mulford concern in Philadelphia, the House of Squibb and Frederic Stearns, of Detroit, are completing plans to manufacture this product, marketing it, of course, under certain specified conditions and working in harmony with the Toronto headquarters.

Insulin is not all blessing. Improperly handled it may be more curse than blessing. Recall that insulin is the substance that changes sugar (carbohydrate) into a combustible substance like alcohol. Remember, however, that so much insulin acts upon just so much sugar. Then we see an urgent necessity for keeping a certain balance between insulin and the food ingested.

To prove this all one has to do is to try it again on the cat or a kindred animal. Take, for instance, a rabbit, whose blood may be

well compared insofar as its sugar is concerned, to that of the human being. Injection of insulin to a normal rabbit will deplete the rabbit's blood of so much sugar that the whole nervous mechanism of the animal is upset. It leaps about in great distress, soon becomes convulsive, and if the dose is large enough, it promptly dies. The same thing exactly results in the human being.

This is why insulin is not a medical instrument which any Tom, Dick or Harry can play with. Indeed, used improperly, it may lose instead of saving a life. For an over-dose of insulin even in the human, upsets the system's balance more radically than diabetes does. Such an upset may be quickly adjusted, however, by feeding more carbohydrate in the form of candy or similar material, to care for the excess of insulin, or by injecting into the over-dosed patient a little adrenalin, which opens the flood-gates of the liver, and the muscle reservoirs, and lets the stored-up glycogen split into sugar, in the waiting blood stream.

Figure 3.

The Body Balance must maintain its equilibrium.
Too much insulin = Upset balance (Hypoglycemia).
Too little insulin = Upset balance (Hyperglycemia or diabetes).

This shows that the unchanged sugar in the blood is as necessary for the business of the body, particularly its intellectual busi-

ness, as the changed sugar in the tissues is necessary for the heating and energizing of the body.

Summing up now—just precisely then what are the advantages of insulin? Is it a cure for diabetes? Once an insulin patient always an insulin patient! Is that so?

Insulin is *not* a cure for diabetes. It may cure diabetes which comes from a pancreas overworked and unable to generate its insulin. For by giving such a pancreas a little vacation by this artificial injection of insulin, its insulin secretory powers may come back. Insulin will not cure diabetes which comes from a totally ruined pancreas. It will prolong the lives of persons so afflicted and greatly lighten their burdens.

There is another phase of diabetes, not previously mentioned, and that is the state of coma which is the dreaded unconsciousness that precedes the diabetic death. The old body furnace of the truly diabetic, unable to consume its sugar, turns now to its fats and oils. As long as life lasts there must be burning fuel. Lacking fire the death cold comes. So the diabetic burns his oil, but only incompletely. Incomplete combustion means poison, and in this self-generated acid poison the sufferer soon drifts into the hard breathing unconsciousness of diabetic coma. Soon comes the end.

But insulin will lift a patient out of this inferno, will call the sufferer even from the brink of death. That, indeed, is insulin's largest and most practical value.

Once an insulin patient, always an insulin patient?

Truly enough the effects of insulin are only transient, and the injections, for that is the only way whereby it may be given, lose their power in a few hours. This makes repeated injections necessary, and this is a great discomfort and disadvantage to the patient. But no one can generally predict how long these injections must be given for each diabetic is an equation unto himself. Each one must be differently treated. And each one will react to insulin according to the individual's own make-up.

The truth of the matter is that sufficient time has not elapsed to warrant anyone attempting to corroborate or contradict it. Certainly good judgment would lead us to state that where the functional activities of the pancreas are only temporarily suspended, insulin need only be given until the organ returns to its job again.

And the usefulness of insulin is as yet but little understood and appreciated. Time will yield a better idea of its range of possibilities. Already we hear of its value in conditions other than

diabetes. Milady has joy brought into her heart for a current magazine boldly, if incorrectly, states that insulin will make the fat thinner and the thin fatter—surely a recommendation calculated to thrill good ladies "standing from afar" on either side of the perfect thirty-six.

The folowing authoritative statement regarding the status of insulin was recently published in the form of a terse report:

> "The researches so far reported indicate that insulin supplies in its entirety whatever metabolic deficiency the diabetic patient possesses. This is an important point in evidence for those who contend that diabetes is primarily and entirely due to disturbed pancreatic function. Its use revolutionizes the treatment of diabetes, but does not simplify it. Its abuse may jeopardize the patient. It should not be used to fatten individuals unnecessarily, nor to enable an obese diabetic to remain obese. The drug is powerful both in its beneficial and in its harmful effects; and it should only be used with a full understanding of both."

But such problems always find their answer in the testing ground of time.

Having found insulin, and having produced it in a large way, has not concluded the research. Much remains to be done and much will be done. Sufficient to state now that insulin is a remedy which has saved many people, young and old from an untimely end, ad with its careful use may valuable lives will be prolonged. Humanity indeed added another joy to its hope chest when insulin came into the world.

OBITUARY

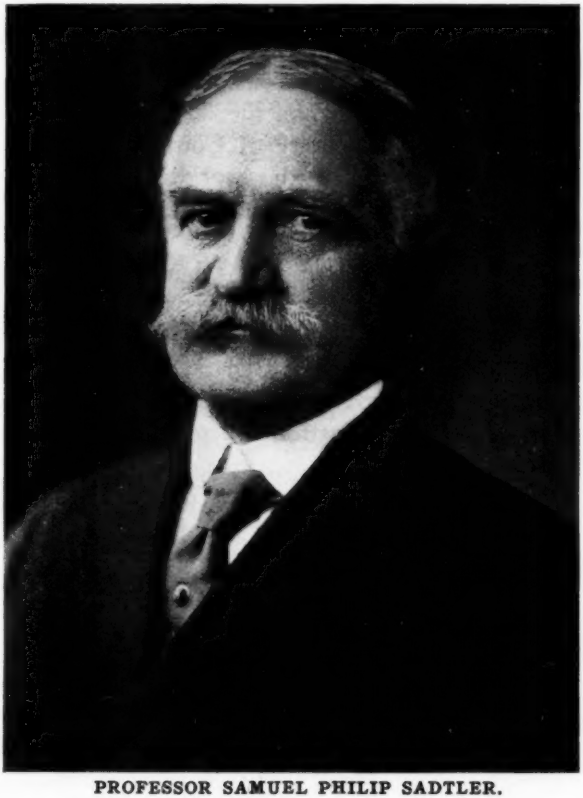
SAMUEL PHILIP SADTLER, A. B., B. Sc., Ph. D.

An appreciation by Charles H. LaWall.

On December 20, 1923, American chemistry lost one of its illustrious workers in the death of Professor Samuel Philip Sadtler. Full of days profitably spent, riches of mind generously shared, and honors modestly borne, he passed peacefully into the sleep that transforms mortality into immortality after exceeding the Biblical allotted span of life by more than half a decade.

Samuel Philip Sadtler was born on July 18, 1847, at Pinegrove, Schuylkill County, Pennsylvania. His father was Dr. Ben-

jamin Sadtler, a Lutheran clergyman who later became president of Muhlenberg College at Allentown, Pa. His mother was Caroline Schmucker, whose father had been one of the founders of Gettysburg College and president of Gettysburg Seminary.



PROFESSOR SAMUEL PHILIP SADTLER.

According to educational statistics, one person in every twelve mentioned in "Who's Who" is the son of a clergyman. Although ignorant of the advantage thus derived from the fortunate environment of his birth he started in early youth to educate himself with exceptional thoroughness, and was graduated in 1867, before the age of twenty, as A. B. (classical) from Gettysburg College, then known as Pennsylvania College. His elementary education had been obtained in Easton, Pa., where he was graduated from the High School.

He then went to Lehigh University for a year, after which he entered the Lawrence Scientific School at Harvard and studied under Wolcott Gibbs and other noted scientists of that day, completing the course in less than two years and receiving the degree of Bachelor of Science, B. S.

Before the Commencement in 1870, at which the Bachelor's degree was to be awarded him, he sailed for Europe to take up post-graduate work. (In the meantime his first alma mater—Pennsylvania College—had awarded to him the degree of Master of Arts, A. M.) He entered the University of Göttingen, Germany, under Friedrich Wöhler, then one of the world's greatest teachers of chemistry. After a year of intensive work he was awarded the Ph. D. degree in 1871.

Immediately upon his return from Germany he became Professor of Physics and Chemistry at Pennsylvania College, Gettysburg, Pa., and continued in this position until 1874, when he was offered the position of Professor of General and Organic Chemistry at the University of Pennsylvania. This professorship was later changed to Organic and Industrial Chemistry, and was held by him until 1891.

In 1878 he was asked to take part of the chemistry lecture work at the Philadelphia College of Pharmacy, as Dr. Bridges' health had begun to fail, and in 1879, when Dr. Bridges retired, Professor Sadtler was elected to the professorship of chemistry in that College, in addition to his professional duties at the University of Pennsylvania.

For a number of years he continued to carry this double burden, but in 1891, after seventeen years of service at the University of Pennsylvania, he relinquished his duties there to devote the whole of his teaching time to the Philadelphia College of Pharmacy. In 1898, upon the death of Professor Trimble, he assumed for a time the Directorship of the chemical laboratories at this institution, being relieved of this in 1899 by Professor Moerk. He continued uninterruptedly as Professor of Chemistry until 1916, when he was succeeded by Professor Stroup, who had become Associate Professor in 1910.

In 1877 he had published his first book, a Handbook of Chemical Experimentation for Lecturers and Teachers.

For many years in the early part of his career Professor Sadtler had been making an illustrious name for himself in industrial

chemistry. A tireless student, who kept abreast of the times in the theory of his profession as well as in its practical applications, he published the first American book on Industrial Organic Chemistry in 1891. This notable work, which has gone through five editions, has been translated into German and into Russian.

In 1880 he became associated with Dr. H. C. Wood and Professor Joseph P. Remington in the revision of the United States Dispensatory, and continued as the chemical editor of that work until 1916.

In 1895 he joined with Professor Henry Trimble in the publication of a textbook of chemistry for pharmacy students, known then as Sadtler and Trimble's Pharmaceutical and Medical Chemistry. After the death of Professor Trimble, Professor Virgil Coblentz assumed his share of this work which in later editions was known as Sadtler and Coblentz's Chemistry.

In 1890, in 1900, and again in 1910, Professor Sadtler was a delegate from the Philadelphia College of Pharmacy to the U. S. Pharmacopœial Convention at Washington, D. C. In 1900 and in 1910 he was elected to the Pharmacopœial Revision Committees of those respective decades and contributed service of great value to the Eighth and Ninth Revisions of the U. S. P.

His first appearance as a chemical expert in court cases was in 1878, when he testified for the U. S. Government in a celebrated suit known as the "Demarara Sugar Case." After that he took an important part in many famous cases of technical litigation concerning patents, among which may be mentioned the following subjects: Chloroform, chrome tanning, glazed kid, linoleum, calcium carbide, adrenalin, ore flotation, asphalt, asbestos, hydrogenated oils and petroleum.

Professor Sadtler believed in supporting the organizations representing his profession and participated actively in a number of those in which he held membership. He was a member of the American Philosophical Society, and its secretary from 1898 to 1902. He was a Fellow of the American Association for the Advancement of Science. He was the first president of the American Institute of Chemical Engineers. He held memberships in all chemical societies of note throughout the world and was a member of a number of professional clubs.

In 1902 he was honored by having the degree of Doctor of Laws conferred upon him by Pennsylvania College, from which he had been graduated thirty-five years before.

Upon his retirement from active teaching in the Philadelphia College of Pharmacy in 1916 he became Emeritus Professor of Chemistry and continued to give occasional lectures, especially upon industrial subjects, to the advanced classes. He retained his membership, however, upon the Board of Trustees, upon which he had served for many years, and in 1921 he became the chairman of this important governing body of the College, and up until the day of his death gave unstintingly of his time, energy and means for the promotion of the progress and welfare of the institution which he had come to love so well.

The outline of his scientific and educational activities would seem to be enough to keep an ordinary man busy for a longer time than was allotted to Professor Sadtler, but concurrently with his scientific work he served for many years in positions of importance and trust in the Lutheran Church, of which he was a worthy member. Associated with several congregations at different periods of his career, on account of change of residence, he became each time a delegate to the Synod of Pennsylvania and usually represented the Ministerium of Pennsylvania in conventions of the General (national) Council.

For many years he was a member of the Board of Trustees of the Philadelphia Theological Seminary. He became interested in 1890 in the publication work of the Lutheran Church and when the General Council Board of Publication (the national board) was organized in 1906 he became a charter member and was its president from the beginning until 1919 when it was merged into the Board of Publication of the United Lutheran Church, of which he was the first and only president until the time of his death.

Professor Sadtler's personality was admirable. Never debating for the sake of argument, quiet, courteous, firm in his adherence to principles or views when once he had decided upon the proper course, equable in temperament, one who could combine modesty of manner with scientific attainments of an unusual degree, he was a splendid example of that all too rare specimen of humanity in these times, a fine Christian gentleman.

He is survived by a daughter and two sons, one of whom, Samuel Schmucker Sadtler, has been associated for years with his father in laboratory and consultation work.

ABSTRACTED AND REPRINTED ARTICLES

CHEMISTRY IN FRANCE IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES.†

By C. A. Silberrad, B. A., B. Sc.

It is always stimulating to have a subject treated in a new way, and still more so when this is well done. There are many works giving the history of chemistry in varying degrees of detail, but there seems to be none on the lines of the one by Dr. Helène Metzger, of which the first volume has just appeared.* Her aim is to trace the development of chemistry during the seventeenth and eighteenth centuries by showing the general state of scientific opinion at the time at which each chemist wrote or worked so as to set his views and discoveries in their correct intellectual surroundings. She gives no biographical details, and emphatically does not hold with Delacre that the only important thing is to determine what each man did, but endeavors to show how the general scientific opinion of the time acted on the various chemists and how their work acted on general scentific opinion. She has confined herself to French chemists and those whose works were translated into French or had any real influence on French chemical thought.

She takes as a starting point the publication of Lemery's *Cours de Chimie* in 1675, and begins by showing what views had been current during the first three-quarters of the seventeenth century, and what was the intellectual *milieu* into which Lemery's book came.

At the beginning of the seventeenth century there was no universally accepted doctrine in chemistry; to a very large extent each successive savant set himself to evolve a theory to explain all known chemical phenomena, and incidentally the universe as well, with little or no reference to any theories previously propounded. Yet, though at first sight independent, certain general trends of thought

† From *Chemistry and Industry.*

**Les Doctrines Chimiques en France du début du XVIIe à la fin du XVIIIe siècle.* By Dr. Helène Metzger. Part I. Pp. 496. Paris: Les Presses Universitaires de France, 1923. Prix 25 fr.

are discernible. At this time chemistry was still very largely regarded as a branch of metaphysics, and theories were chiefly made *a priori,* experiments being subsequently interpreted in terms of the theory and not *vice versa* as nowadays.

In the period preceding the publication of Lemery's book the best known authors were Jean Beguin, Davidson, Etienne de Clave, Arnaud, Lefèvre, Glaser, Thibaut and Malbec de Tressel.

Jean Beguin deems the end of chemistry to be the preparation of remedies, and adheres to the three "principles" of Paracelsus—salt, sulphur and mercury, which by this time, to some extent at least, had come to mean qualities rather than substances. Thus they are never obtained pure, but always mixed with more or less of "phlegm" and *caput mortuum,* and this was held to cause much difficulty in the analysis of bodies. He gives considerable details regarding apparatus and experiments.

Davidson is primarily a metaphysician and disregards the medical side of chemistry almost entirely. He holds to Aristotle's four elements (earth, air, fire and water) and also the three "principles" of Paracelsus, "whose mutual reactions produce all bodies." As a consequence, he believes in transmutation, and holds that in solution the solvent "dissolves that which it recognizes as more or less homogeneous with itself," thus endowing it with a quasi-intelligence.

Etienne de Clave's work is in marked contrast with that of the author previously named. He discusses the various theories of his predecessors and gives reasons for rejecting them and for adopting his five "elements"—water (phlegm), spirit (mercury), sulphur (oil), salt and earth—which he deems mutually inconvertible, but like others appears to confuse qualities and substances. These five elements in various proportions form all substances. He gives, however, very few experimental results.

Arnaud rather resembles Beguin and defines chemistry as "the art of separating the pure from the impure by means of fire in order to prepare remedies or to perfect the metals." He gives numerous details of chemical processes, but little or no theory, and holds pulverization to be the chief operation, every chemical operation resulting "in making the powder finer or coarser."

Lefèvre more resembles Davidson in that he goes into much metaphysical detail. He argues in favor of experiment, yet gives practically no account of any experimental work. He holds that the source and root of all things is the "universal spirit," which has

in itself "three substances distinct and not different . . . a hot, a damp, and a dry," and which is accordingly "triple in its name, in that by its natural fire it is called sulphur, by its moisture it is mercury, and by its dry root connecting the dampness and fire it is called salt." By the action of certain "ferments" (not further described) this spirit takes the form of various bodies and becomes materialized, adopting more or less of the characters of sulphur, mercury or salt, according to the substance which it becomes—the precise process is decidedly obscure. He holds, however, that all substances can be resolved into two or more of five elements, which are well exemplified when dealing with the distillation of organic materials. They are: Phlegm, or the watery distillate; spirit, the gaseous portion; sulphur, the oily combustible matter; salt, the part of the solid residue soluble in water; and earth, the insoluble portion. The chemist can only separate or transfer those elements, which are pre-existent, and consequently he holds transmutation to be possible though not yet effected. Fire, according to Lefèvre, goes towards heaven because "like attracts like." Air is the matrix of the universal spirit, and does not form a part of any compound body, its assistance to combustion being due solely to its removing the products thereof. He gives many "analyses" of organic and inorganic materials which he interprets in the light of his theory, but not forgetting that the main object of such work is the production of remedies.

Glaser accepts the five "principles," which, however, signify rather classes of bodies, but he mainly confines himself to practical details, especially of metals and their compounds.

Thibaut likewise is almost entirely free from theoretical considerations, only giving practical details regarding the apparatus used and the methods of carrying out experiments. He holds that precipitation is due to a combat between the added precipitant and the solvent.

Malbec de Tressel endeavors to uphold the older views; he adopts the four Aristotelian elements and the three Paracelsian principles, but his views are decidedly confused. He gives, however, accounts of various operations.

The authoress, having thus outlined the theories actually current during the earlier part of the seventeenth century, proceeds to greater detail and begins (Chap. II) with a sketch of the place held by the "philosophy of metals" in chemical theory at that time.

In early times a close connection was assumed between the seven planets and the seven known metals, doubtless mainly because both were seven in number and both are bright; then when astrology came to connect the various parts of the human body (also deemed seven in number) with the planets, it was natural to assume the corresponding metal to have a special influence on that portion of the body. But when more metals were discovered the connection with the planets came to be regarded as doubtful.

The similarity in appearance of the metals is probably the root cause of the belief in transmutation. A close analogy was also assumed to exist between the organic and inorganic worlds, and metals were regarded as growing or ripening, the imperfect metals developing into the perfect metal gold, and the alchemist sought to accelerate the process. Their ideas are various and somewhat confused, but one chief line of thought appears to have been that gold of itself has no power of assimilating the baser metals unless there is present a special digestive ferment, the philosopher's stone; and one great object of the adept was to obtain this so as to enable the "seed of gold" (regarded as present in gold) to assimilate to itself the base metals on which it feeds. Further, just as water is necessary to the growth of a plant, so is a liquid necessary to the growth of gold, and this liquid is the "mercury."

Views on the actual composition of the metals were also confused. That they were more or less similar in composition was held certain, both by reason of the general similarity of their properties and as regards several of them by their more special properties. Thus it was held that lead and mercury must be specially closely related by reason of the similarity of their effects on those who worked with them. The general view was that they consisted of mercury and sulphur in varying proportions and of varying purity, though neither the mercury nor the sulphur was the substance now known by that name. Mercury was regarded as the essentially metallic character, the "species of matter which Nature has made to produce gold from"; sulphur was that which by its presence together with the mercury formed the baser metals.

An alternative and later view was that there was one essential metallic substance common in greater or less degree to all metals, but in each metal combined with some material special to that metal, so that to change one metal into another required substitution rather than transmutation.

It must further be remembered that for long it was held that different species of plants were mutually interchangeable. Thus, wheat was held to be transformable into oats. On this ground it was not so unreasonable to assume metals to be changeable one into another.

Thus it appears that the ideas of the alchemists, though to us *prima facie* so fantastic, were not really so devoid of reason. For with the knowledge then available metals appeared much more similar *inter se,* and so might be assumed more easily interconvertible than a metal and its ore. Then given the premise that there is essential similarity between the vegetable, animal and mineral kingdoms, the ideas of growth and ripening follow logically, as also do those of the philosopher's stone and the "mercury."

But why do the alchemists invariably state their results in mystical and enigmatic language? To this there seems no one clear answer. It is hard to believe that all were intentional deceivers, though doubtless many were. One reason was probably the desire to keep results secret or only for those to whom they should personally explain them. Another suggestion is that of Boerhaave, that these directions state rather what it is hoped would be successful than what have been.

As time passed, however, and failure was the result of all efforts at transmutation, doubt as to its possibility became more widespread and the way became more and more clear for views such as the corpuscular hypothesis, though even Descartes held that all visible bodies are transmutable into each other—a natural deduction from his view that the ultimate particles of all consisted of the same material. The fundamental idea of the corpuscular or mechanistic hypothesis was that all bodies consisted of innumerable small particles all of the same material, those of one substance being all of the same shape and different in shape from those of all others. The possibility of changing one substance into another by changing the shape of its ultimate particles was a matter of dispute. Those who held it to be impossible became more and more numerous, and by the end of the seventeenth century the believers in transmutation were negligible in number.

The authoress next (Chap. III) considers the influence of the teachings of Paracelsus, Van Helmont and others. Paracelsus pretended entirely to disregard the teachings of his predecessors and ostentatiously burned the works of Galen and Avicenna, but none

the less in reality made much use of their ideas. He laid great stress on "correspondences" and "analogies," and, though he alleged a contempt for astrology, held that there was a close connection between the planets and the parts of the human body, and as a consequence between the various metals and these same parts. In opposition to Galen, who held that "opposites cure opposites," his view was that "like cured like," which resulted in ideas such as that because gold and the sun and the heart and the sun were regarded as closely connected, therefore gold was a remedy for diseases of the heart, as also anything resembling either, *e. g.*, the citron which resembles gold in color and the heart in shape. Or again salt and fire were analogous because both preserved organic materials from decay. These analogies were extended to the incorporeal world and resulted in fantastic and metaphysical ideas such as that of the microcosm and macrocosm. The very fantastic nature of these developments gradually destroyed them, and with them also the ancient and mediæval philosophy. The great contribution of Paracelsus to science was the incentive he gave to the study of the metals.

In his contempt for Aristotle, Galen and his predecessors generally, Van Helmont resembled Paracelsus, and his system, fanciful though it appears, is a violent reaction against the scholastic philosophy, and is really a systematization of material phenomena as known to him, always limited by the necessity of conformity with the Biblical cosmogony. He holds that the prime material of all bodies is water, whence everything is derived by the action of specific ferments, which either are, or are accompanied by (it is not clear which) a directing spirit termed the "archeus." (Compare *Genesis* i, 2. "The spirit of God moved on the face of the waters.") That water is the one basic material is held proved by various alleged facts, such as that plants produce solid matter from water, and that water, when evaporated, leaves an earthy residue. The idea of the alcahest or universal solvent is invented whereby all things are reducible to "water." The superior density of many substances is attributed to compression of the water forming them. Air was, however, held to be a separate element, not transmutable into water. It did not support combustion, but was the medium that carried away the products thereof. Van Helmont appreciated the existence of other substances similar to but different from air, and invented the term *gas* to denote them. These substances he held to be transmutable into water, having apparently been led to this view by

discovering that water is convertible into steam and back again to water with no change of weight. Later it was observed that air and gases were essentially similar and Van Helmont's "air" came to resemble rather the modern ether. Van Helmont's theories did not spread, and his most important contribution to science was probably his making the constancy of matter as measured by weight the basis of his experiments, though for the time being the chief influence of his views was that they greatly assisted in the final overthrow of the older theories and by holding all matter to be derived from one prime material helped to lead up to the corpuscular hypothesis. The search for the alcahest and for evidence that water was the basic material of all things induced much experimental work.

Next come the dualistic views based on the intrinsic opposition between acid and alkali, whence contrariwise acid and alkali were held to be present wherever any mutual action occurred. Anything soluble must be alkali, and any solvent acid. Thus all fermentation was the result of acid and alkali, and everything in nature including the digestion (solution) of food was explained by the theory, which like its predecessors fell beneath the weight of the subsidiary theories required to "explain" facts, but also like its predecessors was of some value in inducing experimental inquiry. It was finally more or less assimilated by the corpuscular theory which held that acids consisted of sharp pointed particles fitting into holes in the porous particles of alkalis.

The supporters of these various theories disputed with each other in no measured terms, and the authoress gives as an example the famous quarrel regarding the use of antimony in medicine, which, beginning in the sixteenth century was revived in the seventeenth, and formed the subject of a decree of the Parliament of Paris in 1666 authorizing the use. The one party urges for example that as antimony cleanses metals so its compounds must cleanse the human body, to which the other retorted that it does this by killing the body and so cleansing it from all earthly impurities; the opponents of either party are stigmatized as charlatans, robbers, fools, infidels, heretics, abortioners, bastards, forgers, etc.

The authoress next traces the currents of thought which led up to the various corpuscular or mechanistic theories. Gassendi held that all substances consist of differently shaped hard particles in perpetual movement in a void, a theory practically, though not theoretically, in agreement with that of Descartes, who, however, added

two other forms of "matter," one very subtle, forming the "soul of the world," the other less so, but still much less dense than ordinary matter, being the "material" which conducts light. These three forms of matter he held to fill all space completely. Similar views were held by Boyle, who considered that all bodies consist of infinitely small particles, differing in shape and movement. But it was the clear account he gave of his experimental work that gave him the great influence he had.

In this way the corpuscular theory in one form or another spread throughout the scientific world, and chemistry was to be reduced to ascertaining the shapes of the ultimate particles of which matter consisted, abandoning all attempts to explain the universe. There was still confusion as to what bodies were simple, how far acids differed *inter se*, etc., but Boyle must be regarded as "a true predecessor of our modern chemistry."

Having in this way shown what was the chemical "atmosphere" at the time (1675) of its appearance, the authoress gives an account of Lemery's views as disclosed in his book (*Cours de Chimie*). Lemery scarcely notices, save to disdain, the old scholastic theories and adopts the corpuscular theory without remark as though it were self-evident and generally accepted, but goes into no detail to enable us to decide whether he followed Gassendi's view of particles in a vacuum or Descartes' of a plenum. He endeavors to avoid all description that is mystical or ambiguous, and to base his accounts on actual experiment. Adopting the corpuscular theory he seeks to explain the properties of bodies by the shapes of their ultimate particles, but does not go into great detail. His atoms are endowed with cohesion and hardness. To some extent he adopts the acid-alkali theory already noted, but appears at times to overlook what he has said about it. His experimental facts are really the result of experiment and not what he hopes may be carried out. For every result he has an explanation, though sometimes one that, to modern ideas, appears fanciful.

But as the corpuscular hypothesis suggests little connection between the various experiments and no theory as regards the composition of compound bodies, he adopts to a greater or less extent the theory of the five principles (mercury, sulphur, phlegm, salt and earth), deducing them from the results of distilling organic method of subrdinating theories to facts—and of facts he gives quite content to view most of the metals at any rate as primitive

entities which cannot be decomposed by human agency, although they may consist of two or more of the "principles."

In short, Lemery shows a great advance towards the modern matter. But he does not lay great stress on the theory, being many. But it is often hard to interpret his meaning, owing to the impurity of many of the reagents and the confusion of nomenclature. Thus vitriol meant originally ferrous sulphate, then any salt of sulphuric acid, but also came to include other metallic salts, lunar vitriol being nitrate of silver, whilst vitriol of copper included the nitrate and acetate. He gives much information regarding the metals, but his treatment of the chemistry of animal and vegetable matter produced but little result, being mainly limited to distillations and the preparation of drugs. He distilled some 14,000 plants, but was only able to deduce therefrom that this method led to nothing definite, and gradually came to the conclusion that there must be intermediate or proximate principles, and to doubt the true simplicity of the five "principles." Some of his ideas are decidedly fanciful: thus a viper's poison is harmless when swallowed, but dangerous when introduced into the system by the animal's bite, because in the latter case it is violently inserted by the animal by reason of its shape, "which is long and narrow like a gun." But on the whole his work is a great advance on anything that had preceded it in France, and ranks in that country much as the works of Boyle do in England.

The authoress next considers the various views held regarding fire, combustion and calcination. Aristotle held fire to be a principle of lightness diminishing the weight of that to which it was added, and for long it was held to be a definite element. But during the seventeenth century this view was by no means invariable. Van Helmont queried whether it were not an ephermeral phenomenon; the corpuscular theory viewed it as a form of motion, and this was Descartes' view. Though the necessity of air to support combustion and the analogy between combustion and respiration were observed, it was for long believed that there was nothing in the shape of chemical reaction between the air and the body burned. John Mayow held that combustion was due to certain foreign ("igno-aerial") particles in the air. R. Hcoke viewed combustion as due to a "kind of particle which rises from the earth." He recognized that air was unnecessary if these particles were otherwise supplied, as in gunpowder.

It was long before the connection between calcination and combustion was realized. Calcination was "pulverization by means of fire," and ranked with coagulation and precipitation as a process rather than a chemical reaction. The increase of weight was long regarded as an accident and by no means essential, and was variously explained by such views as that the metal was killed on being calcined and so weighed more, just as it was thought a body weighed more when dead than when living; or else that a volatile salt was attracted from the fuel.

Boyle held light to be corporeal and flame a luminous matter which can combine with other bodies and is able to traverse the walls of vessels. Homburg's view was that a "sulphur principle," which is much the same as the "matter of fire," escapes when a substance burns, whereas when a metal is calcined it combines with this sulphur principle and so increases in weight. It is the escape of the "matter of fire" which causes flame.

Jean Rey seems to have been the first to have thought that the increase of weight on calcination was due to the air, but supported this view by such fantastic arguments that it was accepted by none. He does not, however, conceive of combination occurring, holding rather that the air is entangled in the particles of the metal as water in wet sand.

Cherubin held that so far from any "matter of fire" or other material passing through the walls of the vessel (as held by Boyle), the very reverse must take place, as after calcination in a closed vessel air enters on opening it.

Stahl then placed the cause of combustion in the combustible body itself, holding that in both combustion and calcination phlogiston was evolved, and so at least perceived the essential similarity of the two processes; any increase in weight he held to be due to "foreign particles in the air." This view held ground until Lavoisier showed that what really happened was the evolution of heat and gain of oxygen, an essential and not an accidental constituent of the air. What led up to this change of view is to be the subject of future volumes.

The problems of calcination and combustion were by far the most investigated of all; but others also interested chemists, chief among which were the alleged analyses and syntheses of sulphur; the artificial production of fire from its elements; the nature of phosphorus, discovered at this time by Brand and Kunckel; and

the relations of acids and alkalis, subjects which are all treated in this volume.

The differences between the various acids were realized and attributed by Homburg to "different modifications of the same elementary principle." The replacement of one metal by another in combination, as silver by copper and copper by iron, attracted much attention and led first to Geoffroy's theory that if two substances united together came in contact with a third "more nearly related" to one of the two it is replaced thereby, and then later to Bergmann and Berthollet's "affinities."

Thus the mechanistic view or corpuscular hypothesis gradually spread without its being precisely known how. But it left much indeterminate, and when it descended into details, such as the actual shapes of the atoms required to explain various properties and reactions, it became fantastic. Heat was generally explained as due to rapid movements of the ultimate particles, but cold was regarded as an actual substance made up of "pointed particles penetrating the flesh." Solution caused much controversy, though the usual view was that the particles of the solvent being in rapid motion separated the particles of the solute "much as a strong wind does particles of dust," though some held that mutual attractions between the two were also necessary. The authoress also discusses the modification of the mechanistic hypothesis due to Hartsoeker, who held that there were two prime materials, one a continuous subtle fluid always in motion, the other a denser material divided into particles of varying shapes.

Gradually, however, the idea that the shapes of the atoms accounted for the properties fell into disfavor, as it was realized that at best they were largely imaginary, and chemists paid more and more attention to actual experiment, framing temporary theories to explain observed facts.

The foregoing sketch, which only gives the broader outlines of the argument, shows, it is hoped, that the authoress has done that which she set out to do and has done it well. The book is written in that clear style which one has come to expect in a French scientific work, and there is a useful index of the various authors referred to and, to some extent, of the points with which each has dealt. The present volume forms Part I of the work and brings the subject down to the date of publication of Lemery's book (1675).

THE NEWSPAPER AND THE MEDICAL PROFESSION.*

By M. W. Bingay.
(Managing Editor of the "Detroit News," Detroit.)

I have been asked, in addressing you tonight, to give a newspaperman's opinion of the medical profession. One does not have to be a physician to know there is something wrong with the medical profession, any more than one has to be a lawyer to know there is something wrong with the legal profession, or a churchman to know there is something wrong with the church, or a journalist to know there is something wrong with the newspaper. The bricklayer who once laid a thousand and more bricks a day now lays around 300, and all other labor is much the same. There seems to be something wrong with the whole human race. The world is sick and it needs a Doctor, a Divine Doctor—and I do not mean by that a doctor of divinity.

Conquer Ignorance.

We have been traveling too fast in a material sense. In a brief century, the whole mode of thought of the human race has been overturned by the oncoming of the age of mechanics. For countless thousands of years, the world stood still. The printing press, the sunlight of modern man's intelligence, had not been invented; then came Gutenberg with his leaden and movable type, and thought became ubiquitous. The human race as a mass began to read and, feebly, to reason. Men's minds were open, and the flood gates of mankind's inventive genius burst asunder; we are now riding on its torrential floods. It takes three seconds to cross the Atlantic Ocean today; a century ago, it took three months. Napoleon's soldiers could travel no faster than could the soldiers of Hannibal; the messengers of George Washington could bring tidings no faster than could the messengers of Julius Cæsar; the ships of John Paul Jones could not travel faster than could the ships of thePhenicians thousands of years before.

In less than a century, in little more than one span of life, man has triumphed over space and time; he has conquered the earth,

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the air and the waters. In 100 years, he has made more material progress than he did in all the countless thousands of years before. And he has paid the price. He has conquered the whole world only to lose his own soul; but he will win it back; his greatest victory is yet to come, for slowly he is conquering his greatest enemy of all—Ignorance. The world is suffering the birth pains of a new order of life, and in the agony of this rebirth we have lost our perspective on true values; we have lost touch for the time with the things of the spirit, on which all faith is founded. We have lost faith not only in each other but in ourselves. But a new day is dawning. Science with its hand-maiden, the printing press, is conquering ignorance. The physician and the journalist must play a big and vital part in this struggle. And their efforts must be co-operative. When man has conquered ignorance, he may turn to the greatest conquest of all and calm his own restless soul. Then—the millennium; but that is looking too far away.

Joint Responsibilities.

It is of the physician and the newspaper man and their joint responsibilities of the present time that I want to speak. The physician must learn the value of a more generous frankness, not only to his individual patient but to the community at large. And the newspaper man has as much to learn in this connection as has the physician. The honest editor of today not only freely confesses his paper's shortcomings, but also is striving to overcome them. Of our journalistic derelictions of the past and present and our program to overcome them, I shall speak later.

When I say that the public has lost faith in the medical profession, I do not mean it as any especial reflection on physicians; I mean that for the time being man seems to have lost faith in mankind in general and not necessarily in physicians in particular. The human race seems to be temporarily in the moral doldrums. You men of the medical profession seem to sense this condition and are seeking a way out; otherwise, you would not be going so far afield as to get such as I am to address you. You feel there is something wrong with the world, and you want to help by first getting your own house in order. Therefore, I offer you these opinions merely to give you the benefit of a point of view; I speak with no voice of authority; of the science of medicine, I am vastly ignorant. Yet I am asked, and on compulsion, I speak.

The Solution—Service.

To begin with there must be something wrong with this business of being a physician. If there were not, there would not now be springing up all this amazing array of freak schools of medical thought. These schools could not grow and prosper without patronage; and they could not get patronage of so large a kind if the people were satisfied with and had faith in the regular schools of medicine. Granted that these quack schools of the "intellectual underworld" with their prostitution of the mind, have but a transient following, it is nevertheless an outstanding fact that they continue to grow, the deluded victims going from one to another.

I feel that physicians have become victims to a degree of this world contagion of unrest, discontent and oh-what's-the-use attitude of mind. As a newspaper editor, I have a somewhat retentive memory and I recall some remarks along that line delivered to you by Dr. Davis when he retired as your president.

The solution of all these problems of the physicians as well as of men in all other walks of life can be found in the one word *service*. We have all been traveling at so terrific a pace in the world's material development that we have gotten away from ourselves. A physician has no right in this rapidly changing world to quit studying after he has been graduated and given legal permission to practice. He must keep everlastingly at his studies in order to keep abreast of the times; he must know his business in his chosen field of activities, and he must not take upon himself the treatment of a patient when the case goes far beyond his knowledge.

The Day of Simple Faith Has Gone.

You physicians face a different world from that which your fathers in the profession faced. You have got to recognize that fact every hour of the day if you are going to succeed in your efforts to win and hold the public confidence.

We can all remember back in our boyhood how the physician in our community was venerated above all others. The very term "family doctor" meant all that it implies in close human contact. He was the friend and whole-souled adviser, and though he walked with the kings of science, he never lost the common touch. He was feared and beloved as he moved slowly around among his patients behind his old horse. I know of no passage in all literature more

beautiful than the story of the village doctor in Ian Maclaren's "Bonnie Brier Bush," who fought his way through the floods to save the old sheep herder's wife. One gets somewhat the same thrill, in minor key, from the ride of Dr. Kennicott in Sinclair Lewis' "Main Street." I imagine the country physician sees the struggle much more clearly than does the city practitioner.

I give this as an impression and not as a fact. I do not know that the physician has fallen from his pedestal in the estimation of the public. I do not know whether the physician of other days was so venerated. Time mellows all memories. Some one remarked that the London *Times* was not what it used to be, and a wise man answered: "No, and it never was." But we will accept for purposes of criticism that the premise is correct, that the physician has to some degree lost the public confidence. The popularity of the fad schools would indicate that he has. What is the reason?

I rather imagine that the old-time physician practiced in a gentle way a magic through his personality something not unlike the mysticism of the Indian medicine man. They believed in the doctor first and in his pills afterward. That day of simple faith is gone. All authority is questioned in this cynical age of ours. Laws are flouted and delegated powers defied. Your pastor will tell you that even the church of today is a record of crumbling or changing creeds. The physician has not escaped this avalanche of distrust. People will not believe what you tell them simply because you tell them. We of the newspaper profession have long since learned that the people have a knowledge of social hygiene of which their parents knew nothing. There has grown up a generation educated in physiology in the high schools and even in the grammar schools. And for the physician who is trying to win a patient's faith, a little knowledge on the part of the patient is a dangerous thing, unless the physician knows how to talk with him instead of at him. The day when the average patient was so ignorant of bodily ills that he carried a horse chestnut in his pocket to ward off rheumatism has passed.

A Proper Perspective for the Public.

We are in the early gray dawn of an awakening intelligence in these matters, with still a tinge of the night of superstition. We, the patients, see things in a different light, and yet the sun of our knowledge is not sufficiently strong to see them so clearly as we will. But

we do see, and therefore we question and doubt. The physician must help us get a proper perspective.

First, he must educate the public to understand that he is not a miracle man and does not pretend to be one; that platitudinous Latin phrases and nice pink pills will no longer cure anybody; that after all there is but one doctor, Nature. Nature is the one that does the curing and the medical man is merely the nurse in attendance getting the patient ready for Dame Nature's operation.

Second, a physician's ego very often makes him talk to his patient as though medicine were an exact science, when the patient of today knows very well that it is not. He has read and seen and heard too much not to know. I should like to see in every doctor's office a sign, something of this sort:

"I do not know everything.

"Medicine is such an inexact and so vast a science that no one man can know it all. But, what little I do know, I know well; and I know enough to know what I don't know. As your doctor, I will try my best to diagnose your case and tell you what it is that troubles you. If I cannot find out, I will tell you so, and through my knowledge of the profession and your condition I will take you to a specialist on such cases as yours, and I will co-operate with him until we do determine what in thunder it is that ails you."

I think the public should be educated to the value of the specialist and at the same time the vital place and great worth of the general practitioner or family doctor. The office of the general practitioner should be, as I see it, the outer guard for the medical profession; his office should be the clearing house for the specialist. This is the era of specialization and efficiency. The people see it in manufacturing production and in selling and they grow impatient when they find the doctor behind the spirit of the times in this regard.

When Henry Ford opened his factory at Cork, Ireland, he had trouble immediately. The workmen resented the idea of production with every man being given a certain thing to do and do well. They had the old-fashioned idea that one man should be allowed to make a whole car all by himself. It took considerable work to get them away from that idea. Now in medicine the physician sometimes appears in that rôle to his patient. He wants to make the whole machine all by himself. He may be a throat specialist, but he doesn't

mind tinkering with a bad liver as long as that liver belongs to someone else, though he may not have done any studying on liver cases since leaving college.

Absolute sincerity with the patient must be the first requisite to confidence. You cannot get that by telling him you are the doctor and know everything, or by tut-tutting him as you would a child when he asks questions. It's *his* liver and he naturally has a peculiar interest in it. And you should learn so to talk to him that he will understand what you are trying to say. Sell him on your profession rather than on yourself. Let him understand that the practice of medicine must be, because of its vast range, a co-operative movement among physicians on behalf of society.

Inform the Public.

Man cannot live by himself alone. Neither can he, if he is desperately sick, live by one physician alone unless that physician knows his business. And to get to my point as a newspaper man, neither can the medical profession live by itself alone. This world has grown too complicated for any one man, or any one profession, to feel self-sufficient. The individual physician can regain the confidence of his people through co-operative effort by making popular the medical profession. How? By this education of the people. I think the publication of articles by men like Woods Hutchinson, Dr. William Brady and Dr. Evans, who have written in clear, simple English on the problems of medicine for non-medical readers, has done more to create confidence and understanding of the doctor on the part of the public than anything ever done by your profession. Take the people into your confidence and let them know what it is all about and there will come understanding. And with that the quack schools will fade away even as has the horse chestnut as a cure for rheumatism.

Newspapers and the A. M. A.

In this connection, the North American Newspaper Alliance, composed of seventy or more of the leading newspapers of the United States, and of which the Detroit *News* is a member, has made arrangements through *The Journal of the American Medical Association*, not only to secure articles for our public, but to act in an advisory capacity for us.

This means that these seventy newspapers, with a circulation between twelve and fifteen millions, are now in position to avail themselves of information in the hands of the American Medical Association. Each newspaper may write or wire for information and guidance on breaking news stories to make sure that our public is not misled. It is by such co-operative effort as this that the newspaper and the physician, working hand in hand, may go on to their greater destiny of helping society in its struggle upward.

I think there has been in very recent years a great and steady change for the better on the part of the medical profession in taking the public into its confidence; a greater willingness to confide in the individual newspaper man and to work with him. I feel that this attitude on the part of the physician is due in part to the rapidly improving standards of ethics among the better class newspapers of America. I frankly do not blame doctors—or anybody else for that matter—for refusing ot risk their reputations and standing by talking to irresponsible newspaper reporters for yellow newspapers, who will garble and twist whatever may be told them to make a sensational story, with a complete disregard of the evil effects of this misinformation on the public mind. I freely admit that the derelictions in this task of educating the public have not all been on the side of the doctor.

Unfortunately, the average physician does not have an understanding of newspapers and newspaper practice. He either fears all newspapers and refuses to consider the constructive possibilities, or eh loves all newspapers, whether they be sensational or sane, just so long as they play his name in big type. I think the honest newspaper man and the honest doctor agree on the one thing, and that is in their holy hatred of these "publicity hounds." When you find one of these notoriety-seeking doctors and get him into contact with an irresponsible and sensational newspaper man, you have a combination that will do more than any other one thing to wreck all this effort to educate the public on the larger social values.

I know how maddening it must be for the average doctor to pick up a newspaper and find himself quoted as saying that his patient is suffering from "angora pectoris," when he has clearly said "angina." It sort of gets his goat. He may say his patient has "miliary tuberculosis" and learns later that the man is suffering from "military tb." He says "prostate gland" and the reporter

puts him into a condition of complete collapse by writing it "prostrate."

Many of these errors in newspapers which make the physician fearful and skeptical are due to the tremendous speed necessary to get out a daily paper and many are due to plain downright ignorance, and shiftlessness.

The problem of the newspaper in the handling of medical news comes under two headings; first, medical news, that is, live news stories having a medical angle, such as the announcement of the discovery of insulin; second, the instructive feature, such as Dr. Fishbein's article on insulin which we recently published. Now these instructive features must come from men known and recognized in the medical world. In the news breaking stories, especially those of a local nature, it is necessary to trust and depend on some local physician of standing. This we try to do on the Detroit *News*. The American Medical Association is answering hundreds of telegrams and letters from these newspapers of the Alliance to keep our public informed.

And so, you see, the seed of co-operative effort between the physician and the editor has already been sown. The sincere man of medicine who consecrates his life to a study of human ills, who never guesses when by hard work and study he can correctly diagnose a case, holds a position of more vital importance to a community's life than any other. The sincere and intelligent newspaper makes of itself a university through which there is gathered and disseminated the information by which our civilization is maintained.

Let the physician understand this function of the press. Let him realize that not only has the world changed for the physician but it has also changed for the newspaper. No profession in America has made more advanced strides in constructive effort than has that of journalism, during the past ten years. This alliance with the American Medical Association is but one of many steps. We are in a battle just as you are for a renewal and a strengthening of public confidence. When the sincere doctor and the sincere journalist meet on common ground and compare notes, it is found that they are after all working in a common cause, the alleviation of mankind's ills. And while chaos at times seem to rule our world with all its attendant suspicion, synicism and hate, all of us can look forward eagerly to the new order of things, and can say with Mark Sabre:

"O wind, if winter comes, can spring be far behind?"

MEDICAL AND PHARMACEUTICAL NOTES

HAY FEVER AND ASTHMA TREATED BY NEW METHOD.—New studies of rickets and of the convulsive disorders called tetany have shown that benefit follows the giving of calcium with thyroid extract and the use of ultra-violet light. Physicians have treated hay fever and asthma for some years by giving preparations of calcium because good results followed in many instances.

In a report to the American Medical Association, Drs. F. J. Novak and A. R. Hollender, of Chicago, report the results of studies made on patients with hay fever and asthma who were treated by a combination of these modern methods. When the blood of such patients was found to be abnormally low in calcium they administered preparations of calcium combined with thyroid extract and found that the patients had the usual temporary relief. These patients were then exposed to the mercury vapor quartz light which appeared to fix permanently the calcium content of the blood. The investigations are recent and further experience will show whether or not they have practical and enduring results.

ECZEMA OF THE FACE IN INFANTS.—R. W. MacKenna ("Diseases of the Skin," 1923), recommends in eczema of the face in infants, if the face is crusted, or hot or swollen, that starch or boric acid poultices be applied. The poultices, which should be changed frequently, may be kept in place with a light knitted mask. When the swelling, redness and oozing have subsided, apply calamine compresses, and at a later stage either Lassar's paste or zinc ointment with two grains of ichthyol added to each ounce.

If the patch is scaly, or if it has been reduced by treatment from the edematous stage to the scaly one, the following ointment may be used:

Acidi Salicylici	grn. v
Ichthyolis	grn. ij
Ung. Zinci Oxidi	āā ℥ ss
Ung. Aquæ Rosæ	

If an ointment does not suit, the author suggests a prompt return to a lotion, with or without the addition of two grains of ichthyol to the ounce.

INSECT INEBRIATES.—Ants consume more alcohol in proportion to their body weight than does the most accomplished drunkard, asserts Prof. Paul Lindner, chief of the fermenting industry institute of Berlin. The insects whose industry has become a proverb manufacture their own home-brew in their digestive canal by the action of yeasts on the milky juices which they extract from aphids or plant lice which they keep for that purpose.

Other insects have similar home-made home-brew outfits which they use to capacity, Dr. Lindner stated. Wasps are accomplished bootleggers. In the Balkans, where a strong liquor is made from prunes which are fermented and distilled in open vessels in the orchards, the vats are besieged by swarms of thirsty wasps. The queen of another species keeps her favorite yeast in storage during the winter between the tiny hairs of her tongue and deposits it in the spring on the blossoms from which the honey is taken

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THE USES OF KAOLIN IN PHARMACY.—Varieties of koalin specially prepared are utilized as toilet powders. Being absorbent they prevent irritation due to friction. Kaolin is also employed, owing to its absorbing capacity, in making pills, especially with readily reduced or oxidized substances, such as phosphorus pills. In the form of kaolin mass—

Kaolin, fine powder	4 oz.
Soft paraffin, white	8 "
Hard paraffin	4 "

It is employed for pills of potassium, silver nitrate, silver oxide, permanganate and other similar materials, which the ordinary pill excipients would reduce by contact with organic matter.

In a number of carbolic and other disinfecting powders kaolin forms a silicate base. It is also employed for a poultice to replace linseed or bread poultices. Syrups and cloudy solutions of volatile oils are also clarified with kaolin.

The kaolin mass for pills is prepared by melting the hard and soft paraffins, adding the kaolin and stirring until cool.

KAOLIN OINTMENT.

Kaolin	1 oz.
Soft white paraffin	1 "
Hard paraffin	1 "

Melt the paraffins together, add the kaolin and stir until cold.

KAOLIN POULTICE.

Kaolin	577 drachms
Boric acid	45 "
Thymol	½ "
Methyl salicylate	2 "
Oil of peppermint	½ "
Glycerin	375 "

The kaolin is heated in a suitable vessel at 100° C., stirring occasionally, during one hour. Then the boric acid is blended with it, and the glycerin closely incorporated with the mixture. Finally the thymol is added, previously dissolved in the methyl salicylate, and the oil of peppermint, all being made into a homogeneous mass. It must be kept in an air-tight receptacle.

KAOLIN OINTMENT.

Kaolin	6½ drachms
Glycerin	½ ounce
Acetic acid	3 drachms

This is made into a paste and applied to the skin at bedtime. This is not suitable when the comedones (blackheads) are inflamed; it is too irritating. But it is an excellent stimulant.

—*Chemical Age.*

"INTARVIN," A NEW FAT FOR DIABETES TREATMENT.—Announcement of the discovery of "Intarvin," a synthetic fat with an odd number of carbon atoms may completely change our ideas as to the proper diet for diabetic individuals. This new remedy for diabetes is glyceryl margarate, $C_{16}H_{33}COO)_3C_3H_5$ and depends for its efficiency on the fact that margaric acid contains an *odd* number, 17, of carbon atoms instead of an even number as do *all* fatty acids present in the fats and oils furnished by nature.

Diabetes is one of the more common ailments of man. The diabetic is not able to use starches and sugars. Fats are partially digested but there is formed the objectionable group of acids containing 4 carbon atoms, butyric acid, oxy-butyric acid, and acetoacetic acid. It is this last which breaks down to give acetone, a substance that shows in the breath and urine of diabetic patients. The presence of these acids gives rise to acidosis (ketosis) and with this acidosis goes the diminished ability of the blood to absorb carbon dioxide and carry it to the lungs for elimination. When death occurs, it ordinarily is due to acidosis and is generally preceded by a state of coma. Acidosis is always due to faulty fat digestion and never to carbohydrate digestion.

In 1905 it was suggested that there were indications that in the digestion of the fats after the first splitting off of glycerine from the fatty acid, the fatty acid was oxidized by the removal of two carbon atoms at each step. This is known as the bata oxidation theory of Knoop. Lately Dr. Max Kahn, Associate in Biochemistry at Columbia University and physician in charge of metabolic diseases at Beth Israel Hospital in New York City, in studying over the matter, came to believe that if this theory is correct, then, if one would start not with a fat containing a fatty acid of even number of carbon atoms ($C_{18}H_{36}O_2$, $C_{16}H_{32}O_2$, etc.), but with an acid containing an odd number of carbon atoms ($C_{17}H_{34}O_2$, $C_{15}H_{30}O_2$. etc.) there should not be obtained on digestion an acid containing 4 carbon atoms, that is, the objectionable diacetic acid. At considerable expense such odd numbered carbon atom acids were synthesized and fats made from them. The funds for this investigation were provided by Beth Israel Hospital. Trials of these artificial fats showed the patient promptly lost the acidosis of the blood, the gnawing hunger, and improved in general mental and physical health and weight. Unfortunately we would not except the use of such an odd carbon acid fat to be a permanent cure for diabetes. However, it does remove the acidosis effect of diabetes. Accordingly, the patient must continue to take the artificial fat as a food from time to time, otherwise the ingestion of ordinary fat brings about a recurrence of the acidosis condition.

The fats made from the odd number carbon acids have the same appearance, taste, etc., as ordinary neutral fats.

The making of the fat in the laboratory was first under the direction of Dr. Max Kahn and Dr. H. O. Nolan. Later there

was developed in my laboratory methods for manufacture and still later I designed and installed the machinery in the Long Island City plant where it is now being manufactured.

For the purpose of increasing the readiness of digestibility of the new fat, the melting point has been lowered to body temperature by the addition of about 12 per cent. of tasteless mineral oil.

The new fat is known as Intarvin (Int-arvin means "intermediate fat"). It sells for $9 a pound instead of costing $300 a pound to make as did the first two pounds used. A pound lasts a patient about two weeks.

Apparently the treatment is simply a replacement of the ordinary fats which are poisonous to the diabetic patient by a fat which is just as satisfactory a food and which does not give the harmful residual products such as acetoacetic acid. At this writing about 500 patients have received the fat treatment and have had complete removal of the acidosis condition.

NEWS ITEMS AND PERSONAL NOTES

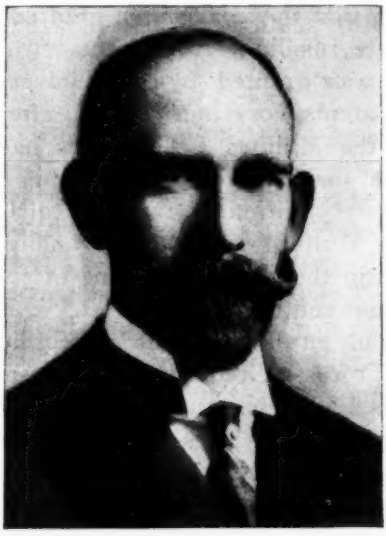
DR. JOHN M. FRANCIS, DECEASED.—A man well known throughout the country, Dr. John M. Francis, died on January 8. Pneumonia developed on New Year's Day and terminated fatally a little more than a week later.

For thirty-two years Dr. Francis was connected with Parke, Davis and Company, during the past twenty years as chief chemist, a position of trust and of great responsibility. He was twice a member of the Revision Committee of the U. S. P.; was a member of this committee, as well as chairman of the Committee on Pharmaceutical Research of the National Research Council, at the time of his death. He was active in church work, kind, modest and courteous.

He received his education at the University of Alabama and at Johns Hopkins. He is survived by a wife, a son and a daughter.

Dr. Francis was a man of unusual ability who visioned broadly and worked quietly in the interest of pharmacy and chemistry. He was uncompromising in his attitude toward low

standards and preparations of uncertain merit, and in this way he has left his impress for all time on American pharmacy. He



DR. JOHN M. FRANCIS.

was a fluent speaker, ready at a moment's notice to take up almost any subject and hold an audience for hours. He was born in Jacksonville, Alabama, in 1867.

G. William Sample, Deceased.—G. William Sample, one of the best-known druggists in York, Pennsylvania, died recently at his home, 135 South Beaver Street, from heart trouble. For more than thirty years Mr. Sample was employed in the prescription department of the Morris Drug Company, and was in his place of employment until six o'clock the evening before his death. On returning home he was stricken at the supper table. Mr. Sample had been in declining health for several years. He was one of the oldest graduate pharmacists in York, and the second oldest surviving graduate of the Philadelphia College of Pharmacy. He was sixty-eight years old.

He was a member of St. Paul's Lutheran Church and an active and prominent member of many local fraternal organizations.

INSULIN LICENSE GRANTED MULFORD LABORATORIES.—Will Be One of Five Centers Manufacturing and Distributing Insulin in the United States.—The H. K. Mulford Company takes pleasure in announcing that they have been granted a license to produce and distribute Insulin.

The license was granted by the University of Toronto, holders of the patents covering Insulin, after the equipment and facilities of the Mulford Laboratories had been inspected by experts of the Insulin Committee of the University. This grant constitutes recognition of the high quality of the work conducted in the Mulford Laboratories and places this Philadelphia institution in the forefront as one of the few sources of supply of this new control agent.

The separation, purification and standardization of Insulin are complicated processes, requiring highly specialized apparatus and chemicals. The construction of a large laboratory unit is already under way and it is anticipated that the Mulford Brand of Insulin will be ready for the market within a very few months.

It will be a source of satisfaction to the many friends of the Mulford Company, among physicians and pharmacists, to know that their years of rich experience in biologic standardization methods and their expert knowledge of methods of handling biological products have been recognized by the Insulin Committee.

The Insulin Laboratory Unit of the H. K. Mulford Company will be under the charge of Dr. P. S. Pittenger, who is well known in the drug world for his contributions to the subject of Biologic Assay Methods of Drug Standardization. The work of this laboratory unit is planned on a large scale and is expected to expand rapidly. Research work is already under way, looking toward economies in the manufacturing process and improved methods of marketing.

Due announcement will be made when Insulin, Mulford, is available for general distribution.

THE AMERICAN PHARMACEUTICAL ASSOCIATION has available a sum amounting to $450 which will be expended after October 1, 1924, for the encouragement of research.

Investigators desiring financial aid in their work will communicate before March 1st with H. V. Arny, Chairman, A. Ph. A. Research Committee, 115 West Sixty-eighth Street, New York, N. Y., giving their past record and outlining the particular line of work for which the grant is desired.

FACULTY ACTIVITIES.—Professor Arno Viehoever was the guest of the Apotheker Verein, of New York City, the evening of January 3d, when he delivered a lecture on "Scientific Hobbies." Dean Lawall has been elected a councillor of the Philadelphia Section of the American Chemical Society. He recently delivered a lecture before the chemical organization of the Haverford College student body. Editor Ivor Griffith was the speaker of the evening of January 26 at the Brooklyn Academy of Music, under the auspices of the Institute of Arts and Science of that city, when he delivered a popuar lecture on the subject of "Pollinosis."

BOOK REVIEWS

MANUAL OF CHEMISTRY. By W. Simon, Ph. D., M. D., and Daniel Base, Ph. D. Twelfth edition. With fifty-five illustrations, one colored spectra plate and six colored plates representing forty-eight chemical actions. 667 pages. Cloth. $5. Lea and Febiger, Philadelphia.

While much of the matter in this deservedly popular book is identical with that found in the preceding edition (1916), there is evidence of careful revision in many places. There have been a few deletions and quite a number of additions, the net increase being nearly eighteen pages.

Among the new items are fairly extensive paragraphs on Synthetic Ammonia, Adsorption, Carbon Tetrachloride, Dakin's Solution, Periodic Classification of the Elements according to Atomic Numbers, Colloidal Solution, Structure of Atom and Electronic Theory of Valence, Hydrogen-ion Concentration and the Meaning of pH.

The subject matter embraces Theoretical Chemistry, Analytical Chemistry (both Qualitative and Quantitative), and Descriptive

Chemistry, as applied to both Inorganic and Organic Compounds. Necessarily, some of it is rather abbreviated, but, all in all, the volume is a very satisfactory source of information in readable form for student, teacher and lay reader. The errors in it are few and generally not serious. What seems to the reviewer as the strangest thing about the book is that this, the second so-called "thoroughly revised" edition to appear since the advent of the U. S. P. IX, should give for the standard strengths of official acids (sulphuric, phosphoric, hypophosphorous, acetic and others), the figures of the U. S. P. VIII. There are so many excellent features about the volume that we do not hesitate to recommend it as a textbook, a laboratory manual and book of reference.

F. P. STROUP.

ERRATUM.

In January, 1924, issue, page 5, line 27 of text, read *"delicti"* instead of *"delecti."*